WITH FIRE WE WON'T PLAY TREASURES CAN BURN AWAY

FOREST FIRE PREVENTION IN THE VALENCIAN REGION

teacher's book

RED ELÉCTRICA DE ESPAÑA

GENERALITAT VALENCIANA
CONSELLERIA DE GOBERNACIÓN Y JUSTICIA

Editors
Red Elétrica de España
Valencian Regional Ministry of Governance and Justice

Editorial direction
Directorate General for Prevention,
Firefighting and Emergencies

Prevention and Firefighting Service

Development
Works and Projects Department

Texts
Miriam Ruiz Álvarez

Contributors
Jorge Suárez Torres
Francisco Navarro Baixauli
Gracia Sapiña Salom
Cristina Calderón Martorell

Acknowledgements
Francisco Tejedor Jordán
Montserrat Simarro Casas
Ana I. Moraga

Draphic design and illustrations
Patricia Bataller Sánchez

First edition
2014

"...we have been talking about different problems for many years, in such a way that instead of encouraging action, perhaps, faced with so many problems, what we are creating are feelings of helplessness and discouragement. I believe that here, as with other topics, we have to encourage people to create situations where it is possible to learn to participate in groups, in the search of solutions that can be put into practice. Encourage people and convey that reality can be changed."

From: Conde, Olga (2002). Educación del consumidor y educación ambiental. Reflexiones en un mismo camino.

Forest fires are a daily phenomenon in our territory, and fighting them takes on many forms, from building infrastructures, such as firebreaks, water storage facilities, forest tracks and paths, surveillance, and firefighting itself, to other activities such as outreach programmes and public awareness campaigns.

We must not forget that around two thirds of forest fires are man-caused, being started either due to negligence or deliberately. This is why training and awareness are essential to attempt to minimise its effects on our territory.

It is with this aim that the Regional Ministry of Government and Justice, supported by Red Eléctrica de España, publishes this educational guide made

Presentation

up by a Teacher's Book, a Student's Textbook and a mobile application which provides highly useful materials for training and raising awareness of forest fire prevention in an easy and enjoyable way.

This first manual, aimed at primary school students from Year 4, is a tool which teaching staff can use in order to deepen their students' knowledge about forest fires, providing all the educational resources needed to fully understand the courses of action available to us to prevent this phenomenon, thus contributing, from every walk of life, including education, to the protection of our forest heritage.

Serafín Castellano Gómez
Regional Minister of Governance
and Justice

Introduction

Why forest fire prevention?

Forest fires are a natural phenomenon in the Mediterranean, but their recurrence and causality are closely linked to human actions, with disastrous consequences such as during the summers of 1994 and 2012.

In the Valencian Region, investigations into the causes of forest fires highlight to what extent people are responsible for the origin and consequences of fires: directly (negligence, intentional fires): at least 70% of forest fires that occurred during the period 2001-2010 had their origin in human activities; indirectly: the origin of forest fires (and also their consequences) come from our territorial model (for instance, the abandonment of rural areas and the excessive accumulation of forest vegetation in the forest, i.e., fuel available to burn).

Some environmental issues with more 'globalised' significance, such as waste recycling and energy saving, are already taught in schools. However, forest fires (and its prevention), so linked to our territory and to our way of life, are not addressed.

What for?

The idea of developing this educational material comes from the interest in enabling people, starting at school age, to create their own perspective regarding the relationship between our behaviour and the environment in which we live, as this implies accepting responsibility for the consequences of our actions. Hence, in this book, we have tried to incorporate ideas that will motivate students to change their behaviour towards collective and individual actions, based on the responsibility towards the environment and specifically in preventing forest fires. (Conde, 2002).

Who for?

The design and the level of contents are aimed at Year Four primary school students and they aim to address fire prevention in a simple, but comprehensive, way, raising the issue of how physical, biological and social elements interact.

How?

Contents are divided into two books, available in print, digitally (PDF) and on a mobile app (Android).

- One, for the students, organised by a series of activities where they have to apply the basic concepts of forest fire prevention provided at the beginning of each activity.
- A second one, for teachers, with all the necessary information for the correct performance of the activities.

Educational targets

The educational targets of these units highlight the capacities and attitudes that are considered relevant for students to develop and embrace, not just to complete the activities in their book, but also for other aspects of their daily lives. They are the following:

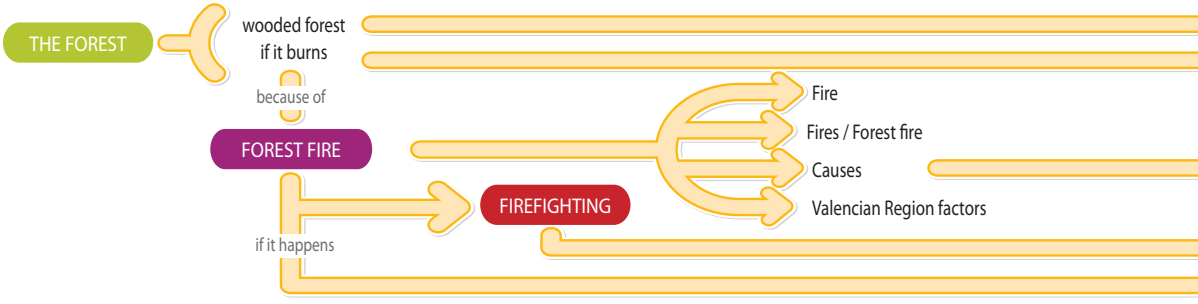
- deepening understanding of specific ideas
- reflecting on and modifying inappropriate behaviour
- evaluating natural and/or social processes
- developing skills

A series of specific objectives are also set out. These objectives are related to the learning of the technical concepts presented in each of the activities, such as understanding the phenomenon of fire or the forest life cycle.

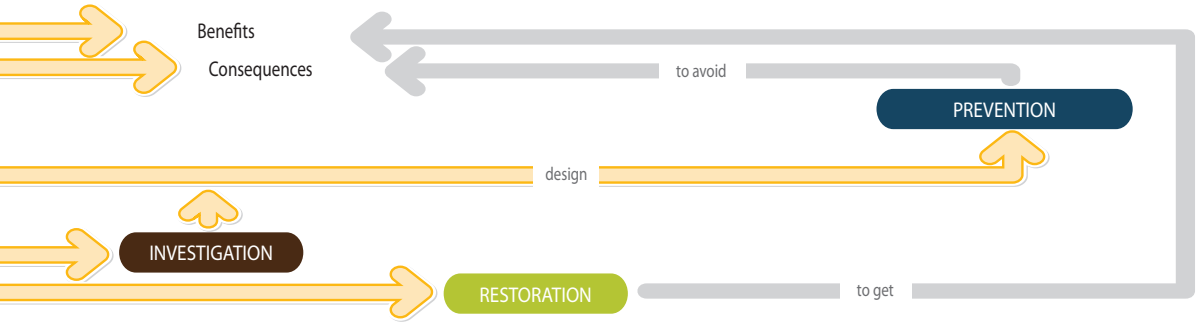
Contents

Contents are developed using basic concepts which provide knowledge and understanding of forest fires and its prevention. The guiding thread, forest fire prevention, is obvious throughout the books (even though it is addressed specifically in one of the sections) via the activities that aim to motivate students to become part of the prevention process, in order to protect the environment, the resources we live off and, sometimes, even our lives. These activities enable students to act accordingly in their daily lives.

Concepts are structured around the following **logical structure:**



And it is organised in the books following this **index**:



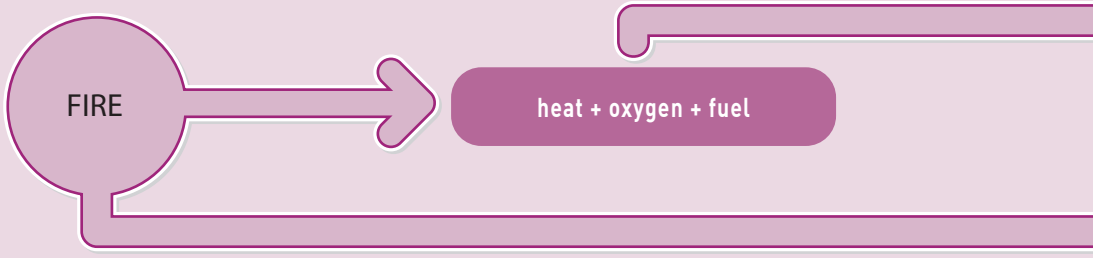
On the following pages you will find a **mind map** where all the concepts explained in the educational material are summarised and linked together:

THE MEDITERRANEAN FOREST

BENEFITS OF THE FOREST, IF THERE IS VEGETATION

WATER	It helps water to be absorbed by the subsoil. It adjusts water availability. It improves water quality. It protects from flooding by regulating the river flows.
SOIL	It protects soil from erosion by reducing the impact of rain. Roots hold the soil together to avoid erosion. Roots aerate the soil and create an adequate atmosphere for soil microorganisms.
AIR	It provides the air with oxygen. It reduces air pollution, partly, because of CO_2 emissions.
TEMPERATURE	It reduces temperature contrasts, avoiding thermal extremes.
LIVING BEINGS	The forest is home, shelter and food for fauna.
ECONOMY AND SOCIETY	It provides a living to many people, directly or indirectly. It is a source of raw materials such as wood, cork and resin, wild mushrooms, pine nuts… It is an attractive place for sport and leisure activities. It provides a rich and varied landscape which is part of our heritage.

FIRE AND FOREST FIRES



CONSEQUENCES OF FOREST FIRES, IF VEGETATION GETS BURNT

It reduces the capacity of subsoil to absorb water.
It increases the capacity of water to erode.

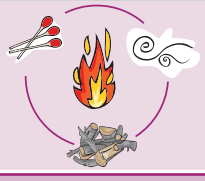
It remains unprotected to erosion because of the water flowing on top.
Soil gets dry and compact, becoming inhospitable to microorganisms.

There is no contribution of oxygen to the air.
There is no fixation of CO_2.

Temperature is not regulated, so temperature contrasts increase.

Refuges and food for fauna disappear.

Many people lose their living, or part of it.
We cannot get raw materials.
It affects sport and leisure activities.
It deteriorates landscape.



forestry vegetation

it spreads without control (**fire**)

FOREST FIRE

CHARACTERISTICS OF THE VALENCIAN REGION

- Continental (inland)
- Arid (in the South)

RELIEF: diversity of reliefs
- coastal plains
- hilly inner areas

CLIMATE: Mediterranean
- dry and hot summers
- dry storms, westerly wind

CAUSES

LIGTHNING

PREVENTION

Investigation of causes

PTo find out the causes of the origin of the fire and then implementing adequate measures to avoid forest fires.

Surveillance

- To detect activities likely to start a fire and then correcting them or discouraging people to carry them out.
- To detect fires as soon as possible and to put them out.

WHAT CAN WE DO?

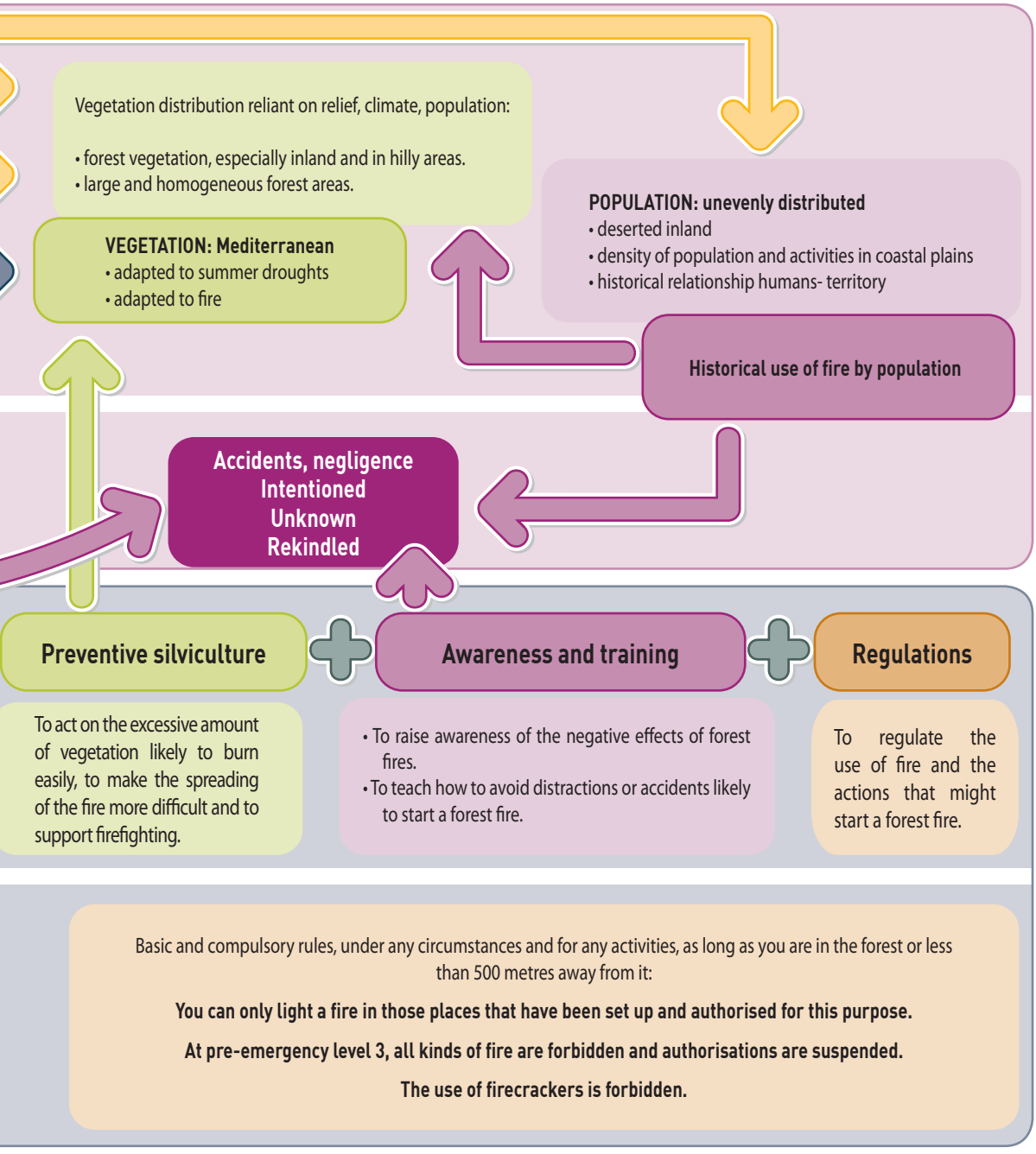
If you see a fire, CALL 1-1-2

To carry out any activity in the forest safely, get INFORMATION from:
www.112cv.com
gva_112cv (twitter)
Your council

If you WORK, LIVE or ENJOY in the forest:

Act with caution and respect, it is your responsibility.

Follow the compulsory prevention measures. Remember that specific legislation exists.



Basic and compulsory rules, under any circumstances and for any activities, as long as you are in the forest or less than 500 metres away from it:

You can only light a fire in those places that have been set up and authorised for this purpose.

At pre-emergency level 3, all kinds of fire are forbidden and authorisations are suspended.

The use of firecrackers is forbidden.

FIREFIGHTING

Personnel

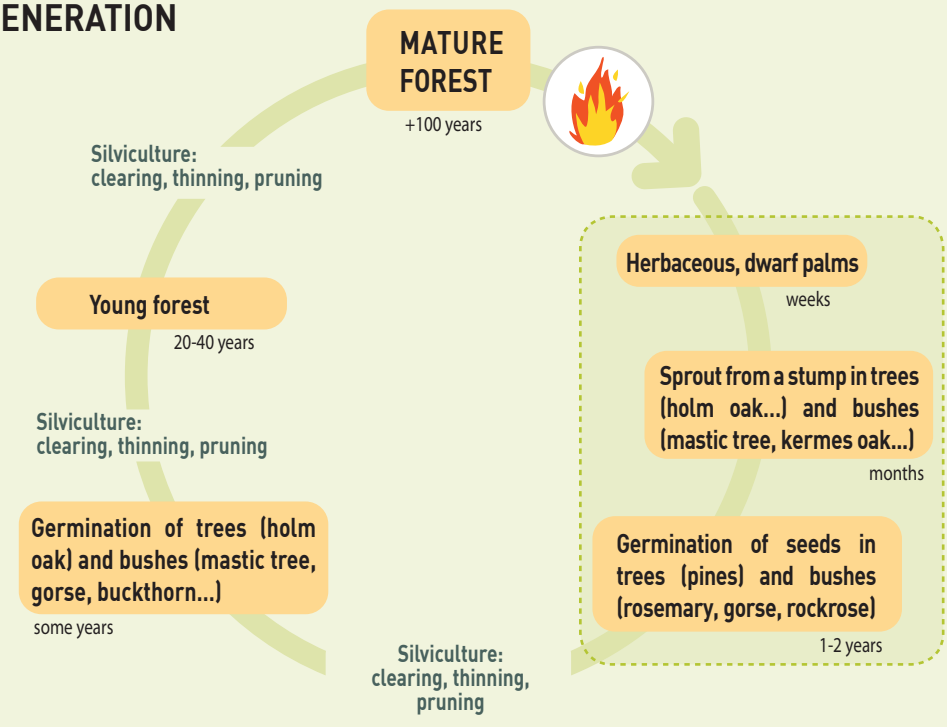
Fire chief

- Coordination and distribution of firefighting equipment during the fire, with the support of the Regional Ministry of Government and Justice's personnel and equipment.
- From the Provincial Firefighters Consortium staff.

Firefighting

- Provincial Firefighters Consortiums.
- Emergency Brigades of the Regional Ministry of Government and Justice.
- Brigades of the Ministry of Agriculture, Food and Environment.
- Military Emergency Unit of the Ministry of Defence.

REGENERATION

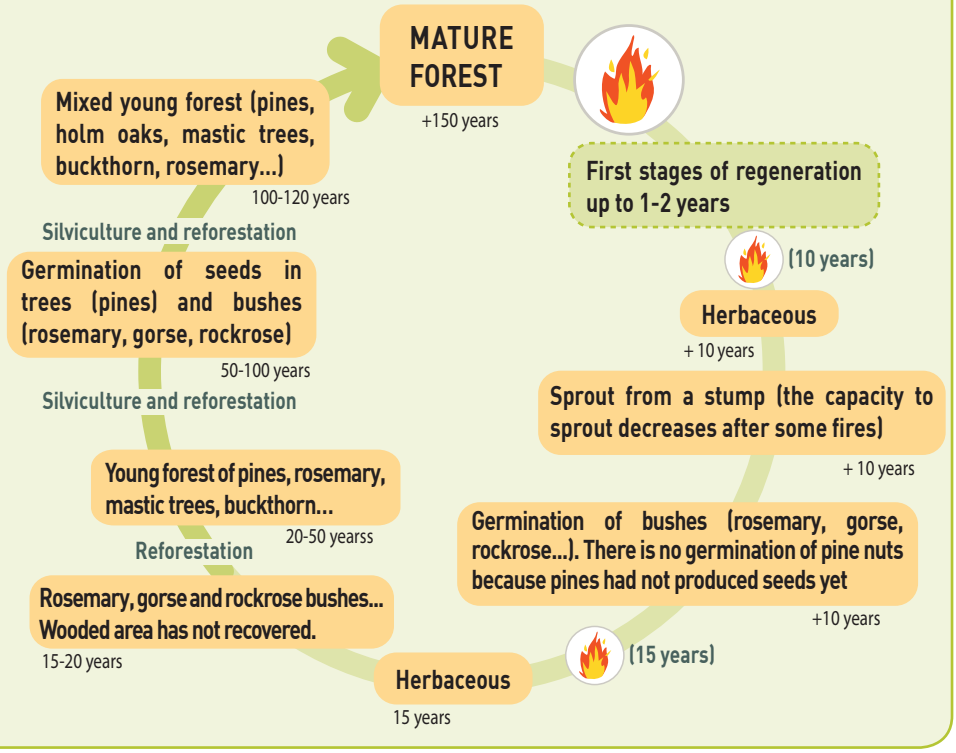


Equipment

- Firefighting equipment: water tankers, helicopters, aeroplanes, tractor with bucket...
- Tools: fire beaters, water rucksacks, rake-hoes...
- Others: digital and communication resources (radios, computers...).

Support in other tasks

- Civil Guard.
- Red Cross.



Structure

Student's textbook and teacher's book are structured differently, in order to meet the specific needs in each of them.

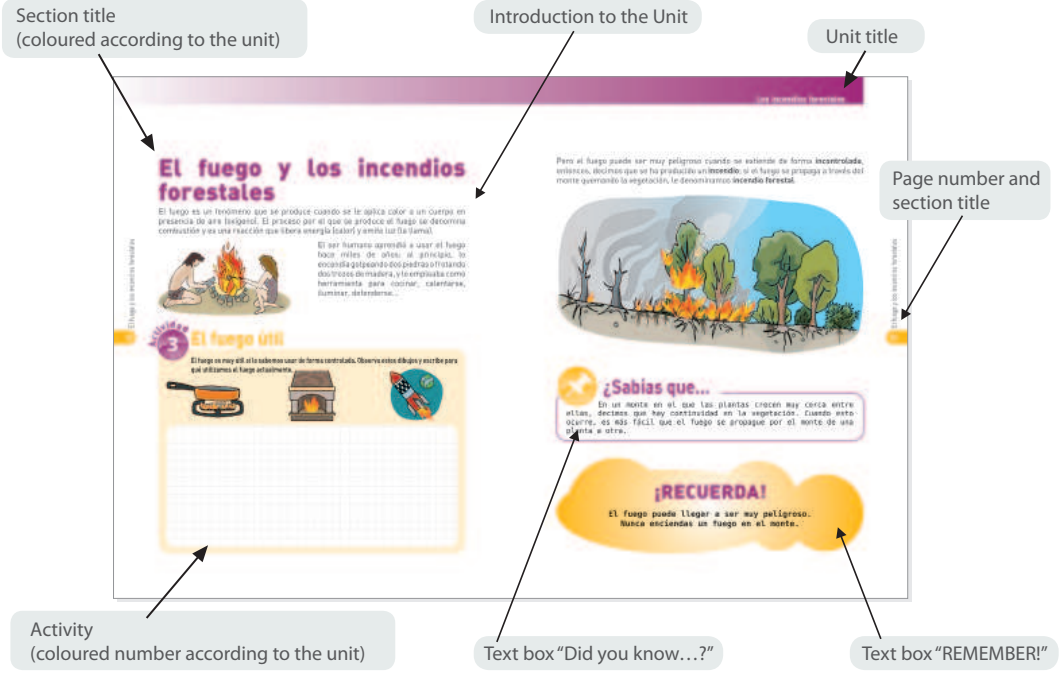
Student's textbook

Contents follow the sequence of concepts showed in the diagram on page 8.

Each of these concepts is developed in two parts visually differentiated:

- a brief theoretical explanation focused on the activities
- the activity itself

Additionally, to summarise, the most important ideas are extracted and outlined in a bright graphic design.

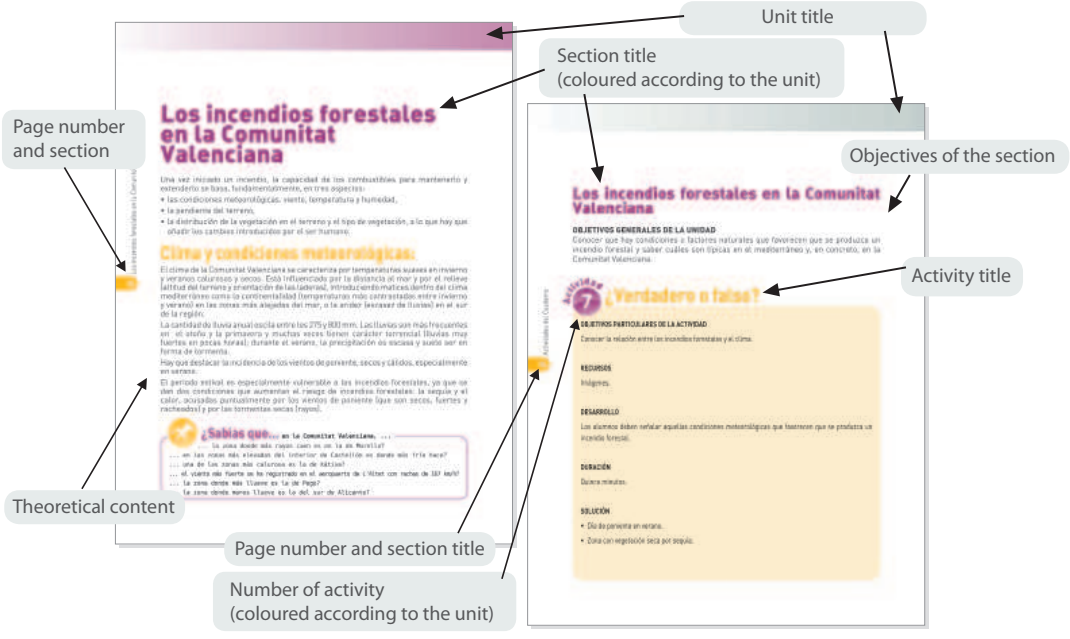


Teacher's book

Following the same sequence of concepts, the book is structured in two groups of information:

- The first group contains the theoretical content.
- The second group contains the activities and each of the key points needed for these to be correctly interpreted and performed.

1. Title: ordinal number and activity's name.
2. Objectives: knowledge/ skills/ attitudes we wish to transmit to the students.
3. Recursos: conceptos y materiales necesarios para el desarrollo de la actividad.
4. Performance: how to carry out the activity
5. Length: estimated time to carry out the activity.
6. Solution: answers or results for each of the activities.
7. Notes: clarifications, suggestions or curiosities related to each of the activities.



Theorical contents

About forests and forest land

Throughout this book, the term "forest" is used to translate the Spanish words **monte** and **terreno forestal**, as these can be used interchangeably in Spanish.

According to the Real Academia de la Lengua Española (Royal Academy of the Spanish Language) dictionary, monte is "a big natural elevation of land or the uncultivated land covered by trees, bushes or shrubs"; forestal is defined as "related or belonging to the forest and to the exploitation of firewood, pastures, etc."

Spanish Forest law also uses both terms. In the Forestry Law of the 8th of June 1957, the definition of **monte** was a concept defined by what it excluded: "Forest land or forest property is the land where tree, shrub and herb species grow, either spontaneously or sown, and when this land does not have the aspect of being farmed, nor used for farming."

However, with the adoption of some regional laws, such as Law 3/1993, 9th December, Forest Law of the Valencian Region, and later in Law 43/2003, 21st December, Forestry Law, the concept of monte is specifically defined. Thus, in Law 43/2003 **monte** or **terreno forestal** "is every area covered by tree, bush, shrub and herb species, of natural or sown origin, which accomplish or could accomplish an ecological, protective, productive, landscape or recreational role". Furthermore, this Law also considers **monte** or **terreno forestal**, amongst others, "forest enclaves within farming lands" and "forestry paths and tracks", and Law 43/2003 considers **monte** as "uncultivated lands, rocky and sandy areas", "abandoned farm lands… which have acquired unequivocal signs of forest status…"

In short, the use of both words refers to the great variety of forest formations in our territory and goes further than the popular concept of forest (as woodlands) or great elevation of land (such as a mountain). With or without trees, and with a higher or lower elevation, we call **monte** (forest from now) the highest peaks, mountain ranges, sand dunes, rocky areas, wetlands, pine forests, thickets, thyme areas, disused lands… Proof of how rooted the word **monte** is in the Spanish language are idioms as "echarse al monte" (meaning "to run for the hills"), "no todo el monte es orégano" (meaning "all that glitters is not gold"), "la cabra tira al monte" (meaning "a leopard never changes its spots"), "batir el monte" (meaning "to go hunting")...

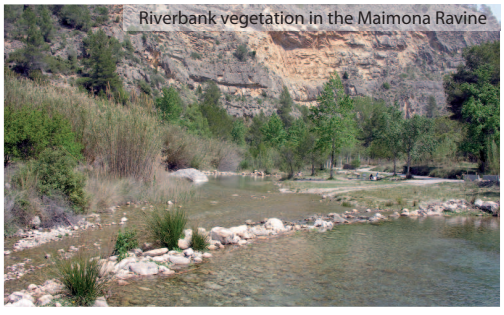

Doñana dunes


Forest in the Pyrenees


Pastures and holm oaks in the Sierra


Vegetation on the Teide


Shrubland in the Sierra de Mariola


Riverbank vegetation in the Maimona Ravine

The benefits of the Mediterranean forest

Benefits of forest:

Ecological:

- Vegetation protects soil from water erosion by holding it together with its roots and reducing the impact of raindrops (when raindrops hit the soil, the latter disintegrates making it more likely to be swept along by the water).
- It adjusts the availability of water by improving infiltration into the subsoil and increases its quality.
- It protects the territory from flooding by adjusting river flows.
- Al captar la energía del sol para realizar la fotosíntesis y sombrear el suelo, disminuye los contrastes de temperatura, evitando los extremos térmicos.
- It is an oxygen source, necessary for life.
- It reduces air pollution from CO_2 emissions.
- It provides home and shelter to flora and fauna.

Social:

- It is the place for many sport and leisure activities.
- It is part of our heritage and gives us a rich and varied landscape.

Economic:

- It provides a living for many people (hotels, forestry workers…).
- It provides raw materials such as wood, cork, resin, as well as wild mushrooms, truffles, pine nuts, …

When the forest burns...
(How fire affects the forest)

With a simple glance, we can identify a fire-affected area because the landscape deteriorates: the distinct shapes and colours of vegetation disappear and everything becomes a sort of greyish desert. People who live nearby lose the landscape of their childhood.

But the effects of a forest fire go much further.

Forests, i.e. nature, are a source of life, health and wealth. It is the place where a large, and diverse, number of living beings coexist: animals, plants, microorganisms… All the living organisms that inhabit forests interact and play an important role for each other as well as for human beings (for instance, they produce clean air and water, as well as many other necessary things such as wood, wild mushrooms, honey, grass for livestock…).

In a forest fire not only do plants burn, but animals are also affected: they either die or have to move to other places because they lose their nourishment and shelter.

Also, the soil is greatly damaged because of the high temperatures reached during a fire: the creatures that live underground, and break down organic matter to allow plants to grow, also die. On top of this, the land loses the protection of plants, thus flowing rain water detaches soil and ashes dirtying rivers, reservoirs and, sometimes, even cities and towns (floods).

Air becomes polluted as well because of the smoke and because vegetation stops absorbing CO2 from the atmosphere.

During a fire many resources used by humans are destroyed, especially in rural areas. Many people lose their livelihood (cottages, farm schools, campsites…) or part of their income (crops, pastures, hunting, honey, wood, cork, pine nuts, houses…). Occasionally, people die; people who live in the area, but also people who put out the fire.

Fire and forest fires

Fire is a phenomenon that occurs when heat is applied to a fuel in the presence of air (combustion). That is to say that, to make fire, we need three elements: a heat source, air (actually, oxygen) and fuel. The process of combustion releases energy (heat) and emits light (the flame).

In many of the activities in our daily lives we use fire in a controlled and useful way. When fire spreads without any control, it is simply called a fire, and if it spreads over the forest, burning vegetation, we then call it a forest fire.

Did you know...?

In a forest, where plants grow very close to each other, we say there is "continuity in the vegetation". When this happens, fire can spread more easily through the forest, from one plant to another.

REMEMBER! **Fire can be very dangerous.**
Never start a fire when you are in the forest.

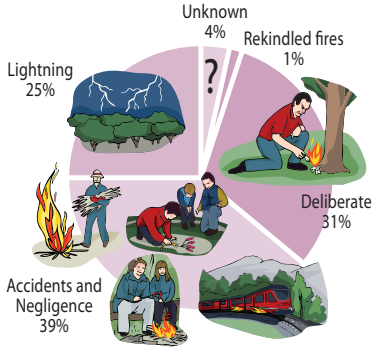
The causes of forest fires

Since prehistory, the use of fire has been very common in the Mediterranean area, not just as a tool for everyday tasks (lighting, cooking, heating, burning stubble, fighting, etc.) but also for festive purposes (bonfires, firecrackers, fireworks…).

On more than one occasion the misuse of fire for these purposes has caused a forest fire.

In fact, humans are responsible for most of the forest fires in the Valencian Region (70%); 25% occur due to natural causes, 1% are rekindled and the remaining 4% occur due to unknown causes.

The pie chart on the right shows the causes of forest fires in the Valencian Region for the period 2001-2010.



Percentage of fires, by cause, in the Valencia Region (2001-2010)

Causes are classified as follows:

Natural origin

- lightning hits the forest and vegetation burns.

Man-made origin:

- **Accidents or negligence:** it is when a fire is started due to carelessness or by accident with the perpetrator not intending to burn the forest. It happens, above all, whilst doing the following activities:
  - spotting produced by agricultural burning, trains (they might produce sparks), bonfires (made by day-trippers, shepherds, farmers…), smokers, use of engines and machinery (they might produce sparks) during forestry works, in road works...
  - and, to a lesser extent, beekeeping activities, fireworks, children games, hot air balloons…
- **Arson:** they are fires started intentionally (by arsonists and pyromaniacs) where the perpetrator intends to burn the vegetation. Within these types of fires we don't talk about causes, but about the motivations to cause damage (disputes, revenge, vandalism) or for economic gain; people who start these fires are called arsonists, as opposed to pyromaniacs, who would start a fire deliberately because of their mental health.
- **Unknown causes:** the cause cannot be established.
- **Rekindled fire:** a fire that revives after being declared extinguished.

REMEMBER!

If you see fire or smoke in the forest or its surroundings, tell an adult immediately so that they call 1-1-2 (one – one – two)*.

* Más información sobre el 1-1-2 en las páginas 31 y en el Anejo de la página 43

Forest fires in the Valencian Region

Once a fire has started, the ability for the fuel to remain lit and to spread the fire is based, fundamentally, on three aspects:

- weather conditions: wind, temperature and humidity,
- slope of the land,
- distribution of vegetation on the land and vegetation type, including changes made by humankind.

Climate and weather conditions:

Climate in the Valencian Region is characterised by mild winters and hot and dry summers. It is influenced by the distance from the sea and by the relief (altitude and direction the slopes face), as these introduce nuances, within the Mediterranean climate, such as "continentality" (wider range of temperature between winter and summer) in areas further away from the sea, or aridity (shortage of rainfall) in the south of the region.

Annual rainfall ranges from 275 mm to 800 mm. Rainfall is more frequent in autumn and spring, and it is often torrential (heavy rain in a few hours); during the summer, rainfall is scarce though produced, usually, with thunderstorms.

The incidence of westerly winds should be noted, as they are hot and dry, especially in the summer.

The summer months are particularly vulnerable to forest fires as there are two conditions which increase the risk of their occurrence: drought and heat, occasionally reinforced by westerly winds (strong, dry and gusty) and thunderstorms (lightning).

Did you know...? in the Valencian Region,

... the area with the highest number of lightning strikes is Morella?
... the coldest areas are the elevated areas of inland Castellon?
... Xativa is one of the warmest places?
... the strongest winds have been recorded at L'Altet airport, with gust of 167 km/h?
... the wettest place is Pego?
... the driest area is southern Alicante?

Relief:

The Valencian Region is a narrow strip of land parallel to the Mediterranean coast that descends from the Meseta plateau to the sea in a series of stages. It is characterised by a great diversity of reliefs, as a result of the presence of two mountain ranges, the Iberian and the Betic, both of them steep with different aspects, and this causes a physical compartmentalisation of the land that produces many nuances and differences within a small distance.

A large part of the forest land in the Valencian Region has a hilly, and sometimes is very steep, relief making it quite inaccessible and complicating forest fire prevention and firefighting.

Relief also affects the speed at which a fire spreads, as it moves faster when it goes up the slope of a mountain.

Vegetation:

The variation in physical and climate characteristics of the territory conditions vegetation. To this we must also add the effect of human activity having been present in this area for many years.

The common feature of natural Mediterranean vegetation is the adaptation to summer droughts (sclerophyllous vegetation, with small leathery leaves, which has very efficient mechanisms for harnessing water). Dominant tree species are holm oaks and pines (especially Aleppo pine and maritime pine). The undergrowth is woody, prickly and aromatic, with species such as mastic trees, Mediterranean buckthorns, rockroses, rosemary and thyme. In colder areas we find black pines, wild pines and junipers; in more humid areas there are Gall oaks; on siliceous soils, cork oaks; on the river banks we find poplars, willows…

Fire has always been naturally present in the Mediterranean territory, caused by lightning. Thus, vegetation is also adapted to this phenomenon and has regeneration mechanisms that use the effects of fire (pyrophytes) for seed dispersion and germination in sunny areas where other species cannot survive.

Fire, humans and forest:

Nowadays, the distribution of forest vegetation originates largely from man-made activities over the course of centuries:

Humans discovered fire in nature, but it was when they succeed to light and manipulate it (approximately 400,000 years ago) that they mastered one of the more useful elements for the progress of civilisation.

Originally, they used fire for heating, lighting, cooking, scare off animals…, and later on it became an efficient tool to fulfil other needs, such as deliberately burning vegetation to create agricultural land or as a war weapon. Nevertheless, forest fires, as we know them today, did not appear until the mid-twentieth century.

Up until then, people were linked closely to the countryside and the forest, where they found food, medicines, raw materials to make clothes, wood for heating, cooking, building houses, furniture and tools, etc. Throughout all those centuries, humans, despite removing great swathes of forest, found a certain balance with nature.

During the second half of the twentieth century, industrialisation was fully implemented in the Valencian Region. This meant a new economy and new production methods; the workforce was replaced by machines (in factories, but also in the countryside, for example by tractors), and many of the materials and handmade tools, that until then were made by craftsmen and from natural products (wood, fired clay, cotton…), began to be produced more quickly and cheaply in factories using oil products, such as plastic.

This entailed a change in the way of life; rural populations moved from the country to the city searching for work, synthetic products prevailed over natural ones… In short, society became more and more urban. Even in villages, land and traditional activities related to nature, such as growing crops, livestock farming and getting raw materials from the forest (wood, firewood, cork…), were abandoned.

The natural vegetation which was originally removed from these lands, now lying neglected, is starting to recolonise it again. Yet, these forests never return to how they were. Instead, dense vegetation lacking in diversity, in terms of in shape and the number of species, appears, increasing the risk of forest fires. In turn, frequency (number of fires), recurrence (repeated fires in the same area) and fire extension make the situation worse.

Look at these maps of the Valencian Region.

In this map, the darker patches represent the area that has been burnt by fire between 1993 and 2012; the red patches are the largest cities.

If we compare the size of the different coloured patches, do you think a lot of land has been burnt?

Most fires are put out quickly, and burn areas smaller than your house, but some devastate areas four times greater than the city of Valencia.

In this other map, the dark patches highlight each individual fire during this period.

As you can see, forest fires are numerous and happen all over our region, but only a few are responsible for burning almost all of the total area burnt.

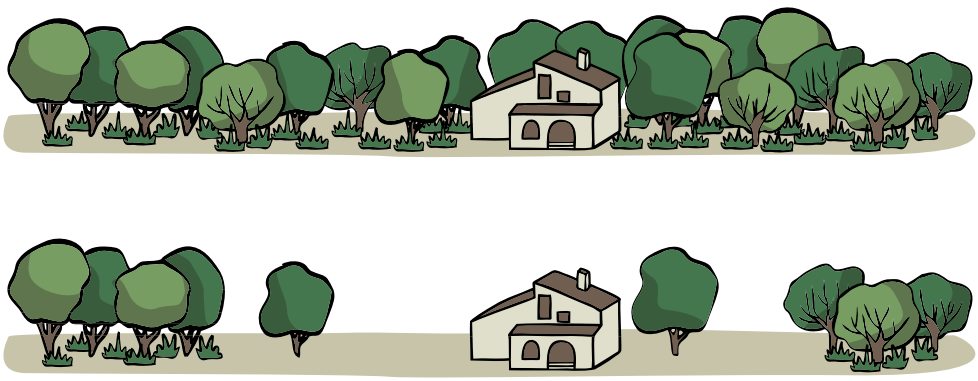
Did you know that the majority of fires are caused by humans?

Can we do anything to stop this? Of course we can, and were going to find out how in the following pages!

Forest fire prevention

La prevención de incendios forestales engloba todas las actuaciones encaminadas a evitarlos y consisten en:

- **Preventive silviculture:** acts on trees and bushes to reduce the amount of vegetation that burns easily. It is with this aim that thinning (reducing numbers by cutting down damaged or sick trees), pruning (cutting down the lower branches of trees) and clearing (removing plants when bushes are too dense) activities are carried out. This makes it harder for the fire to both start and spread. For instance, if vegetation from the sides of the road is cleared, a lit end of a cigarette thrown from a car would have fewer possibilities of starting a fire or it spreading through the forest. On the other hand, if we have a country house surrounded by a perimeter where the vegetation has been managed, reducing the amount of fuel available, and a fire starts in the forest, it will be harder for the fire to affect the house.



- **Surveillance:** carried out by professionals who travel around the forest in order to detect any incident related to forest fires (misuse of fire, warning of fire…); they know the forest well, how to behave in nature and they inform people about it.

You can also be on the lookout in the forest: if you see fire or smoke, tell an adult to call 1-1-2 (one – one- two).

- **Awareness:** in order to raise public awareness about the negative effects of forest fires and to inform so that fires that might start forest fires are not lit. It is carried out, amongst others, by Prevention Patrols, Environmental Agents, educational campaigns, advertisements, ...

- **Regulation broadcasting and information**: as well as other information broadcasting channels, the Valencian Government provides the 112cv service. 1-1-2, the Emergency Number (pronounced "one, one, two, not "one hundred and twelve") is a free public service that answers emergency calls made by anyone in the Valencian Region, for instance, those requiring healthcare, firefighting, rescue, public safety or civil protection.

  On their website (www.112cv.com) we can find information regarding forest fire prevention, such as a Manual of Good Practices, which provides advice, suggestions and information about what can and cannot be done in the forest, and what to do to reduce the risk of forest fires, for example:

REMEMBER!

Only camp in authorised areas with the relevant permit (permits should be requested seven days before).

Only light a fire in places that have been set up and authorised for this purpose (for example, authorised barbecues or "paelleros").

Remember that you can look this up in:

TELÈFON D'EMERGÈNCIES COMUNITAT VALENCIANA 112

www.112cv.com • gva_112cv • your council

A great number of people and equipment are involved in forest fire prevention:

- Environmental Agents: law enforcement agents; amongst many duties related to natural environment protection and management, they undertake forest fire prevention and surveillance activities.
- Prevention Patrols: they carry out prevention, surveillance and awareness activities, for example, education and information about fire hazards and use of fire, correcting dangerous activities, monitoring storms in case lightning causes a forest fire...
- Technical staff: experts in information processing who use software to support the prevention and firefighting tasks.
- Forestry and environmental volunteers: they give information, raise awareness and educate users (day-trippers, owners, workers…).
- Emergency Brigades, Spanish Civil Guard, Local and Regional Police: they collaborate in prevention, especially on red-alert days, and they participate in firefighting.
- Civil Protection: it is a public service which aims to prevent situations of serious collective danger or catastrophes and to protect people and goods when these situations take place.
- Ministry of Agriculture, Food and Environment and the Spanish Meteorological Agency: provide the Valencian Government with the necessary information to prevent and fight fires.
- Society in general: we can also collaborate by calling 1-1-2 and informing about potential forest fires.

Available equipment:

- Helicopters and aeroplanes: they fly over the territory in the Valencian Region, watching from the air for any fires that could cause a forest fire.
- Vehicles: environmental officers, brigades, volunteers, etc. use them to get a better accessibility to the forest and to detect possible forest fires or activities that might cause them.

- Fire watchtowers: located in places with the best visibility of the territory (usually mountain peaks), they are used by the forestry brigades to monitor the territory, detect fires and collaborate in firefighting.
- Information and Communication Technology: using computers, mobile phones, radios… people involved in forest fire prevention (as well as in firefighting) are connected in order to transmit information and to be able to respond quickly to any situation regarding forest fires.

Did you know...?

The smoke from a fire can tell us many things if we know how to interpret it: what is burning, how much is being burnt, and the direction it is spreading ...

- White: light fuel like grazing grasses, cereals...
- Light grey: small-medium sized shrubs.
- Dark grey: large shrubs and trees.
- Yellow: when pine trees are burning.

REMEMBER!

You can also be on the lookout in the forest:
if you see fire or smoke, tell an adult to call 1-1-2 (one – one- two).

TELÈFON D'EMERGÈNCIES COMUNITAT VALENCIANA 112

Fighting forest fires

Despite all the prevention measures seen above, sometimes, forest fires occur. When they do, a great number of people and means are mobilised to extinguish the fire.

Firefighting effectiveness does not depend simply upon when the fire is being fought, but also on the work done previously, which includes the specialisation of the staff (firefighters, pilots…), the maintenance of forest paths to allow firefighting vehicles movement, building water storage, the detection and communication infrastructure (fire watchtowers, 1-1-2 service, weather forecast…) and many other things. Coordinating these aspects, and decision making, are key to quickly controlling and completely put out a fire.

Human resources working in firefighting are:

- Fire chief: in charge of coordination and distribution of firefighting equipment during the fire; from the Provincial Firefighters Consortium staff.
- Provincial Firefighters Consortiums: besides taking over the fire management, they participate in firefighting.
- Emergency Brigades (helicopter and terrestrial): they participate in firefighting using helicopters or vehicles. They come under the Regional Ministry of Government and Justice's command.
- Volunteer firemen: they collaborate in firefighting and come under the Provincial Firefighters Consortiums' command.
- Technical Unit for Forest Fire Prevention: they collaborate with the fire chief providing information about weather conditions, land features (relief, paths, water storages…) and the evolution of the fire (burnt area). They come under the Regional Ministry of Government and Justice's command.
- Civil Guard: They are in charge of evacuating inhabited areas and of surveillance; they also take part during fire enquiries. They are part of the Ministry of Home Affairs.
- Red Cross: they are in charge of any medical incidences and they assist displaced people.
- Military Emergency Unit (UME, in Spanish): they participate in fighting large fires when asked to do so by the affected region; they are part of the Ministry of Defence.
- Forest Fires Support Brigades (BRIF, in Spanish): personnel who are highly qualified in firefighting. They participate in fighting great fires when asked by the affected region; they are part of the Ministry of Agriculture, Food and Environment.

Material resources:

- Machinery for firefighting: water tanker, helicopters, airplanes, tractor with bucket...
- Tools: fire beaters, water rucksacks, shovels, rakes...
- Others: computer and communication equipment (radios, computers…).
- Firebreak network: made up of wide strips of land where vegetation has been removed in order to stop fires and to control them more easily.
- Water network: guarantees water resource availability to terrestrial (for instance, firefighters) and aerial (planes, helicopters) firefighting equipment; usually water storage facilities, ponds and even reservoirs.
- Road network: roads, tracks and paths allow quick and safe access to the forest area, for both firefighting and prevention equipment and personnel.

Did you know...?

A forest fire's temperature can reach as high as one thousand degrees centigrade and can spread at one hundred meters per minute?

Remember that water boils at one hundred degrees centigrade and a person walks two to three kilometres in an hour.

REMEMBER!

Firefighting is very dangerous, even for expert professionals.

In a forest fire, never act of your own accord. The best way to help is to listen to the professionals.

Investigating the causes

When a forest fire happens, there is a lot of information to gather in order to find out the origin and causes of the fire. From a prevention perspective, it is important because it allows the creation of appropriate measures to avoid other fires.

A specialised team of Environmental Enforcement Officers, called the "Operational Group of Forest Fire Investigations" (GOIIF, in Spanish) carries out the investigation of the causes of forest fires, though the Civil Guard and Regional Police can also take part. All of these personnel are considered law enforcement agents. Legal experts might also intervene; they are designated by a judge to carry out the investigation.

In order to avoid the alteration or destruction of any existing evidence in the area, the investigation starts even before the firefighting. The data studied is large and varied, as, even in the areas surrounding the burnt area, important evidence for the investigation might be found (paths, vehicles, fences, car tracks, footprints…).

It is necessary to find the ORIGIN of the fire, i.e., the exact point where the fire started. Investigators study the information related to the factors that affected the spread of the fire, such as the wind, the slope and the fuel (vegetation), as well as the clues hidden in the materials the fire burns along its way (burnt areas of the vegetation, stains on the stones, soot on metallic fences…), allowing them to work out the direction the fire spread.

Investigators use different pieces of equipment whilst working, such as:

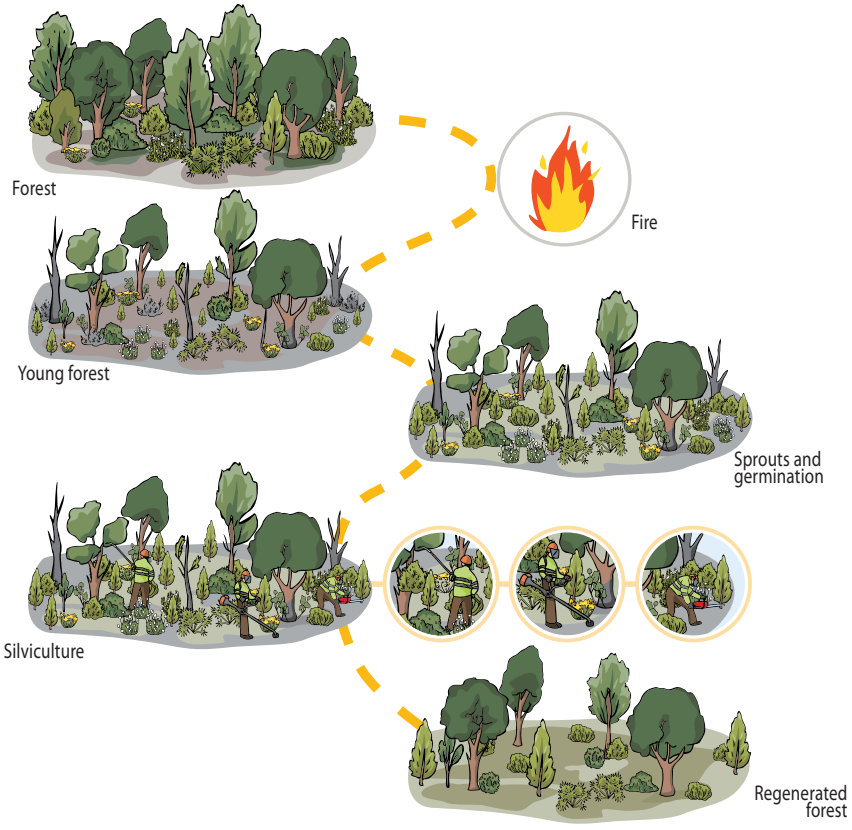
- Markers: these are small flags used to indicate the point of origin.
- Ruler: used as size reference in pictures.
- Magnet: to find small metallic particles.
- Camera: used to reproduce scenes susceptible to change over time, to support written descriptions, to capture evidence that cannot be transported...
- Compass: to indicate direction.

Once the point of origin has been determined, the CAUSE can be obvious (lightning scars on a trunk, agricultural burning, bonfire, vehicles involved in an accident…) or not (explosions, use of machinery, cigarettes, pieces of glass or metal…).

How does the forest regenerate itself after a fire?

In natural conditions, forest vegetation spreads across the forest according to how fertile the soil is, how moist it is, the shade and the relief…and it lives in balance with its surroundings, even when natural disasters occur such as fires, landslides, strong winds or avalanches.

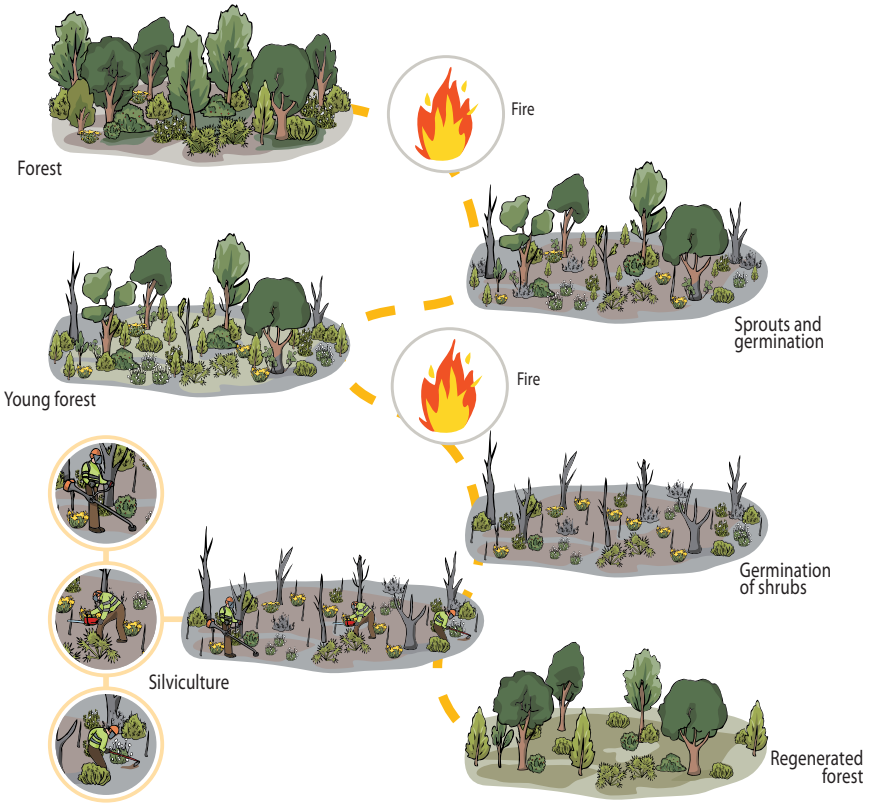
The following diagram shows the stages from the starting of a fire to the regeneration of the forest. Silviculture can help the regeneration cycle of the forest.



When the Mediterranean vegetation was categorised, the adaptive mechanisms plants developed to react to forest fires were detailed as well as how a wooded area, where the trees have produced seeds or are able to sprout, can regenerate without human intervention (reforestation). After germination, and once a new generation of trees appear, silvicultural activities can be carried out to favour the growth of the best specimens and to reduce any excess vegetation as this increases the risk of forest fires.

However, a forest that burns in just a few hours takes many years to become a mature forest again. So long (usually 120 years), that we will never get to see it fully recovered.

Yet, when many fires happen in the same place, and without giving new trees time to germinate, it is very difficult for the wooded forest to recover:

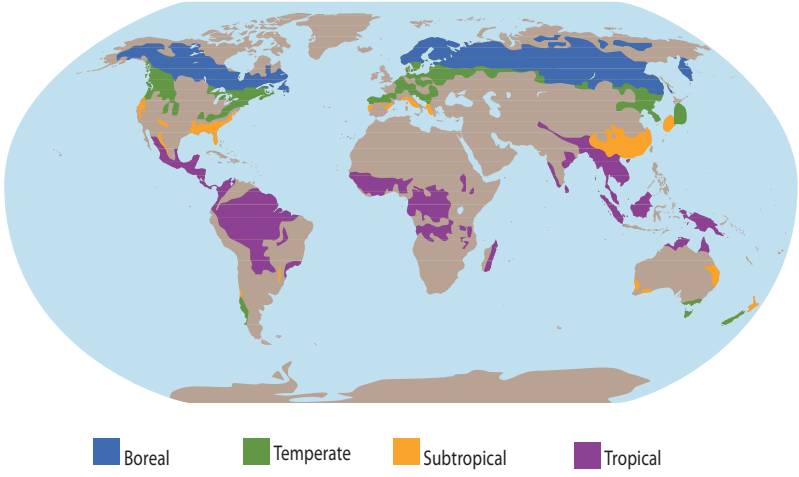


In this case, we could evaluate whether or not reforestation might help the regeneration of the vegetation cover by planting native trees and bushes which are able to germinate and grow in the rough conditions produced after a fire (heavy insolation, wind exposure, scarcity of nutrients…).

Forest fires in the world

Forest fires are frequent in the Mediterranean basin, but also occur in other areas of the world, either being man-made or a product of nature.

Next we can see, summarised, fires and their causes in the different parts of the world*:



Boreal forest

Fires in Canada and Northern Eurasia are caused by lightning strikes during the short summer. In the majority of cases, these fires are left to burn, allowing for natural regeneration.

In the Baltic Sea basin, fires are associated to drought conditions, a phenomenon not very frequent in these areas.

North American temperate forests

This region goes from the South of Canada to Central America. In the hilly areas, fires caused by lightning are frequent; in populated areas, especially in the USA, human negligence and arson are part of the causes.

Central American and Caribbean forests

In Central America, almost all the forest fires are started deliberately. Fire is used to create crop areas for corn by burning the forest. Due to social conditions (lack of resources) and natural conditions (low fertility of soil), farmers are forced to abandon their fields every four years and to burn new areas in order to cultivate them: it is survival agriculture, i.e., to get food to survive.

Amazon tropical rainforest

Fire is also used to create pastures and land for growing crops.

Savannahs in the Southern hemisphere

In the Pampas of the Southern Cone, the South African deserts and the Australian bush**, locals start fires and let large land extensions burn to keep pastures for wild fauna and for the livestock.

Sub-Saharan savannahs

Similarly, here fires are man-made: shepherds burn natural vegetation to get pastures.

South East Asia

The large population density means that deforestation occurs to plant crops. In 1987, 3,500,000 hectares of forest land were burnt, and 2,000,000 in 1997.

China

There is no detailed data available, but there is evidence of large forest fires, such as one in 1987, which burnt over more than 1,000,000 hectares.

*Source: Vélez, R. (2000) La defensa contra los incendios forestales, McGraw Hill

** Refers to landscapes with sparse vegetation (savannahs, bushes, Mediterranean forest). In Australia, eucalyptus and bushes predominate.

Protecting nature, you protect yourself REMEMBER!:

SOM prevenció

Fire can be very dangerous. Therefore, when you go to a forest:

- do not light a fire,
- take food from home instead of cooking,
- do not use items with flames like camping gas, lighters, matches...
- do not leave rubbish. Pick it up and throw it away or take it home with you.
- only pitch your tent in an authorised area and with the required permit (remember, request in seven days before).
- if you see fire in the forest, or its surroundings, tell an adult so they call one-one-two (1-1-2) immediately.
- in a forest fire, never act of your own accord. The best way to help is to stay calm and listen to the professionals.

For more information visit:

TELÈFON D'EMERGÈNCIES COMUNITAT VALENCIANA 112

www.112cv.com • gva_112cv • your council

What you need to know about

Qué debes saber sobre el

the emergency number

el teléfono de emergencias

Call 1-1-2

Puedes llamar al 1-1-2

- To contact any emergency service (police, fire brigade, ambulance).
- In all 28 countries of the European Union.
- From your home, mobile phone and also public phones.
- For free.
- La llamada es gratuita.

When?

- Call 112 in any emergency where police, fire brigade or ambulance is needed.
- You have seen an accident in front of the school.
- Someone is seriously hurt while playing.
- You see a house, a forest... on fire.

¿Qué debes hacer?

Do...

- Ante todo, mantén la calma.
- If possible seek help of an adult first.
- Otherwise, call 112 and explain the situation to the person on the line and try to explain exactly what and where it is happening.
- Give your name, address and telephone number to the person answering your call.
- Si has llamado por equivocación, no cuelgues, espera a que contesten y di que ha sido un error.

Do not...

- Call 112 to get general information (traffic, weather etc.).
- Call 112 if it is not a real emergency.
- Make telephone jokes.
- Hang up if you dial 112 by mistake.

More information sources to increase knowledge:

www.gov.gva.es
Competent Regional Ministry in forest fire prevention and firefighting (Valencian Government).

www.cma.gva.es
Competent Regional Ministry in forestry issues. (Valencian Government)

www.112cv.com
Emergency number in the Valencian Region.

http://www.magrama.gob.es
Information about forest fires concerning institutional coordination between administrations, prevention, firefighting, safety of the personnel involved in forest fire defence, statistics, publications…

http://www.magrama.gob.es/es/ceneam/quienes-somos/
National Centre for Environmental Education (CENEAM in Spanish). Ministry of Agriculture, Food and Environment.

www.elcortafuegos.com
The firebreak. Environmental education school campaign for forest fire prevention. (Ministry of Agriculture, Food and Environment).

http://www.jcyl.es/web/jcyl/MedioAmbiente/es/Plantilla100/1171896486781/_/_/_
Centre for Fire Defence (CDF, in Spanish): training, environmental education and forest fires research.

www.asturias.es
Topics / Agriculture and forests / Forestry policy/ Forestry Awareness and Education.

http://www.aragon.es/
Home / Public Departments and Organisations / Agriculture, Livestock and Environment / Forests / Forest fires / Forest fires publications

http://www.cortafuegos.com/downloads/librillo06.pdf
Fuego en el corazón y árboles de España. Documentation about forest fires and cards of the main tree species in Spain. (Ministry of Agriculture, Food and Environment).

http://www.magrama.gob.es/en/biodiversidad/publicaciones/fuego_en_el_corazon_tcm11-268084.pdf
Fuego en el corazón. 2012 Edition.

http://www.juntadeandalucia.es/educacion/webportal/web/educacion-ambiental
ALDEA programme. Environmental education programme for the school community (in the Environmental Education section, Regional Ministry for Agriculture, Fishing and Environment. Andalusian Government).

http://ec.europa.eu/digital-agenda/en/kids-corner
Kid´s corner. 112 emergency number (European Commission).

http://www.fao.org/forestry/es/
FAO's Forestry Section.

http://www.edufores.com/fundacion/index.htm
Development of materials and supporting initiatives for forestry education and training, especially for the youngest.

Activities in the Book

The benefits of the Mediterranean forest. How a fire affects the forest (When the forest burns...).

GENERAL OBJECTIVES OF THIS UNIT

To be aware that the importance of nature goes further than being a reserve for animals, plants and landscape, and to recognise its essential role in guaranteeing our health and our quality of life.

The forest's treasures

SPECIFIC OBJECTIVES OF THIS ACTIVITY

To highlight the distinctive features of the forest's functions in the Mediterranean area.

RESOURCES

Fill the gap exercises and supporting pictures where the words, missing in the text, are shown.

PERFORMANCE

Students should fill in the gaps with the help of the pictures.

LENGTH

Thirty minutes.

SOLUTION

Vegetation protects the soil from erosion and prevents landslides and flooding because: it holds the soil together with its roots and reduces the impact of the rain, helping water infiltration into the subsoil, where it is stored in aquifers, and feeds into water sources and rivers as clean water. We need this water to drink, whether we collect it from a reservoir or a spring. These are all ecological benefits.

Many people enjoy the countryside: they go hiking, ride their bicycles, enjoy the fresh air and the landscape, learn about plants, animals and geology.These are social benefits of the forest.

Many other people generate their income from the forest because they may have a hotel, a farm-school, a campsite…or because they sell products which come from the forest (wood, cork, pine nuts, wild mushrooms, honey…).

Activity 2

When the treasure is stolen from the forest

SPECIFIC OBJECTIVES OF THIS ACTIVITY

To understand the consequences of forest fires at an ecological, social and economic level.

RESOURCES

Fill the gap exercises and supporting pictures where the words, missing in the text, are shown.

PERFORMANCE

Students should fill in the gaps with the help of the pictures.

LENGTH

Thirty minutes.

SOLUTION

When there is no vegetation, the air becomes more contaminated.

This happens because a large part of the oxygen that exists in the atmosphere is generated by plants via photosynthesis. Many living creatures use this oxygen (O_2) to breathe. Plants also take in CO_2 from the air, reducing the amount of this gas in the atmosphere, which is one of the gases responsible for contamination.

When the Earth's surface is not covered with vegetation, it heats up very quickly when the sun shines on it, and it cools down rapidly at night.

If there is vegetation, however, plants capture sunlight for photosynthesis whilst shading, at the same time, the Earth's surface with their leaves. This is how vegetation helps maintain stable ambient temperatures.

When the forest is damaged and it loses its vegetation, the landscape worsens and we lose part of our natural and cultural heritage.

Fire and forest fires

OBJETIVOS GENERALES DEL TEMA
To understand the fire and forest fires conceps.

Useful fires

SPECIFIC OBJECTIVES OF THIS ACTIVITY

To understand the phenomenon of fire and its uses.

RESOURCES

Pictures.

PERFORMANCE

Students should identify the objects shown in each picture and write down their names.

LENGTH

Ten-fifteen minutes.

SOLUTION

- Gas stove
- Fireplace
- Space rocket

NOTES

This activity can be easily extended by asking students about other uses of fire.

The causes of forest fires

GENERAL OBJECTIVES OF THE SECTION
- To understand the causes of forest fires in the Valencian Region.
- To understand that the majority of forest fires are caused by humans.

Activity 4

Natural causes of forest fires

SPECIFIC OBJECTIVES OF THIS ACTIVITY
To understand that fires have always been naturally present in the Mediterranean area and that this fact has to be considered as another ecological factor (besides climate, geology…) which shapes ecosystems.

RESOURCES
Pictures.

PERFORMANCE
Students should highlight which of the two given options is NOT correct.

LENGTH
Five minutes. Ten minutes if the contents of the notes are presented.

SOLUTION
The volcano

NOTES
The Valencian Region has two volcanic areas (of the four existing in the Peninsula). One of them is the so called Cofrentes Vulcano, located in the Agrás Hill, with an altitude of five hundred metres; studies of this volcano show that it was last active around two million years ago. Nearby spas use thermal waters that are heated by gas emissions which come from the depth of the volcano. This is why it is considered to be "dormant".

The Columbretes Islands are of volcanic origin and it is believed that the last volcanic activity took place three hundred thousand years ago; that is to say, it is "extinct".

Finally, in the area near to the village of Picassent, there is evidence of the existence of a volcano due to the remains of volcanic rocks found there, allowing us to deduce that volcanic activity may have occurred there around eight million years ago.

Activity 5

The causes of forest fires in the Valencian Region

SPECIFIC OBJECTIVES OF THIS ACTIVITY

To understand that the majority of forest fires are caused by humans due to negligence or by accident.

RESOURCES

- Fill the gap exercises and supporting pictures to work out the information missing in the text and to describe the activities shown.
- Dictionary (paper/online).

PERFORMANCE

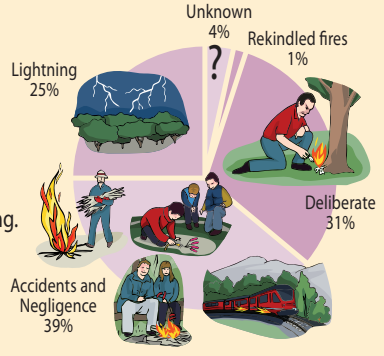
Students should work out the two percentages asked for and write down the causes. With the help of a dictionary (paper/online) and the picture provided, they should describe the activities shown.

LENGTH

Thirty minutes.

SOLUTION

1. "25%" of forest fires are caused by nature and are started by lightning.
2. "70%" of forest fires are caused by humans, with the majority being started by accident or due to negligence.



Percentage of fires, by cause, in the Valencia Region (2001-2010)

NOTES

Activities that can cause forest fires (see page 25):

- spotting from agricultural burning, trains (they might produce sparks), bonfires (made by travellers, shepherds, farmers), forestry works who burn forest residues, smokers, use of engines and machinery (which might produce sparks), electric lines…
- to a lesser extent, beekeeping activities, fireworks, children's games, hot air balloons…
- fires started intentionally (due to disputes, revenge, vandalism, for economic gain, being able to use the land for farming or livestock …)

Students can look up the meaning of "negligence" in the Oxford English Dictionary website (www.oed.com).

Activity 6

Find the causes within your surroundings

SPECIFIC OBJECTIVES OF THIS ACTIVITY

• To motivate students to observe their surroundings and to interpret the information they get from it, by analysing, in this case, the characteristics or elements they can link to forest fires causes.

• To be aware of the daily activities that use fire, and can be the origin of a forest fire if they are not done with caution.

• To insist on the idea that we all interact with our natural surroundings and that we are responsible for our behaviour.

RESOURCES

• Every student provides information about the territory he or she knows.

PERFORMANCE

The teacher starts the activity by encouraging the students to think of a place they know and then guide them to also think about its different features:

• soil cover: built up, crops, forest, beach...

• settlements: city, town, estates, isolated houses, industrial areas...

• activities which take place: agriculture, livestock farming, industries, quarrying, recreational area, fire crackers, barbecues…

LENGTH

One hour.

SOLUTION

Different according to each student.

Forest fires in the Valencian Region

GENERAL OBJECTIVES OF THE SECTION

To understand that there are natural conditions or factors that can help start a forest fire and to know which ones are typical in the Mediterranean and, in particular, in the Valencian Region.

Activity 7 True or false?

SPECIFIC OBJECTIVES OF THIS ACTIVITY

To understand the relationship between forest fires and climate.

RESOURCES

Pictures.

PERFORMANCE

Students should highlight the weather conditions most likely to start a forest fire.

LENGTH

Fifteen minutes.

SOLUTION

- Westerly winds in the summer.
- Area with dry vegetation due to drought.

Activity 8

Smoke signals

SPECIFIC OBJECTIVES OF THIS ACTIVITY

To understand the relationship between forest fires and relief.

RESOURCES

Pictures.

PERFORMANCE

Students should highlight the picture that shows where it would be easier to spot a forest fire, by seeing smoke or flames, and in which one it would be easier to put the fire out.

LENGTH

Ten minutes.

SOLUTION

C. In the flat agricultural areas near the road.

NOTES

Distance and breadth of vision are reduced in the mountain. With a hilly relief, the presence of a forest fire can remain unnoticed until the smoke rises above the mountain, if this blocks the view between the fire and us. We will not see the flames until they get closer or pass over the side of the mountain that is in our field of view.

In a flat area, the only limits will be human sight and the visibility conditions at that moment.

On the other hand, flat areas are, normally, better communicated by roads than hilly areas, hence they are more accessible to land based extinction equipment, reducing the time to get to the fire area.

Activity 9

How fire spreads through forests

SPECIFIC OBJECTIVES OF THIS ACTIVITY

To understand the relationship between forest fires and vegetation, by highlighting the influence of human activities on the vegetation's distribution and its consequences in the spreading of forest fires.

RESOURCES

Pictures.

PERFORMANCE

Students should link each text with the corresponding picture.

LENGTH

Twenty minutes.

SOLUTION

B- In this area there are no trees because it has been set alight several times over the years. The vegetation has become a thick and dense shrubland. There is continuity in the vegetation and fires spread easily through it.

C- In this forest, its managers have removed the shrubs and some trees to allow grass to grow; the trees are tall and grow with enough space between them. If there were a fire, it is harder for the fire to spread from the grass to the trees or between trees because there is not continuity in the vegetation.

A-The landscape of many towns, especially inland in the Region, is varied because forest areas exist alongside crops (fruit, cereals…). This diversity means that there is not continuity in the vegetation, making it harder for fires to spread.

Forest fire prevention

GENERAL OBJECTIVES OF THIS SECTION

- To raise awareness of the fact that forest fires caused by humans can be avoided.
- To raise awareness of daily situations where our own actions could start a forest fire and to know safe alternatives to avoid them.
- To train students to act responsibly regarding forest fire prevention in different situations.
- To encourage a positive and active attitude in forest fire prevention.

Activity 10 Let's go camping!

SPECIFIC OBJECTIVES OF THIS ACTIVITY

To understand how to prevent fires by behaving correctly, during our leisure activities, when in nature.

RESOURCES

Pairs of pictures.

PERFORMANCE

In each pair of images, students should identify the one that shows good behaviour and the one which does not.

LENGTH

Thirty minutes.

SOLUTION

On a picnic: sandwich.

After the picnic: throw rubbish away into a bin or take it home.

Camping: torch

Stopping for a break: drink water, eat some nuts

Playing: looking at birds, flowers...

Activity 11

The careful architect

SPECIFIC OBJECTIVES OF THIS ACTIVITY
To learn about other situations in which fire prevention measures can be applied, such as when building a house.

RESOURCES
The plan of a house and pictures of different objects: a swimming pool, a hose, a barbecue, a diesel tank, wood, a gas bottle and a jerrycan with fuel.

PERFORMANCE
Students should place each item in the correct place of the house plan.

LENGTH
Twenty minutes.

SOLUTION

Activity 12

Protecting the forest you protect yourself

SPECIFIC OBJECTIVES OF THIS ACTIVITY

To connect forest fire prevention with the protection of people and nature.

RESOURCES

Pictures and definition of actions.

PERFORMANCE

Students should write down, in the first picture and in the correct place, the action needed for the vegetation to look like it does in the second picture.

LENGTH

Twenty-thirty minutes.

SOLUTION

Activity 13

What is it used for?

SPECIFIC OBJECTIVES OF THIS ACTIVITY

To learn about some of the people who work in forest fire prevention and the equipment they use.

RESOURCES

Pictures.

PERFORMANCE

Students should identify the correct item that the fire lookout should use in order to resolve the problem.

LENGTH

Ten minutes.

SOLUTION

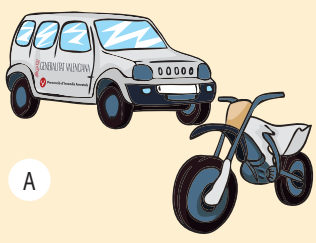
A. To walk through forest paths.

B. To attend an injured person.

C. Not to get lost in the forest.

D. To communicate with colleague in order to give warning of fires, emergency situations …

E. To watch the land from the air.



A

E

B

C

D

Fighting forest fires

GENERAL OBJECTIVES OF THIS SECTION

To understand how forest fires are put out and the equipment used to do so.

Activity 14 Joining forces

SPECIFIC OBJECTIVES OF THIS ACTIVITY

- To learn about the large number of people and equipment needed in firefighting.
- To understand the complexity of coordinating so many teams and the responsibility of each of them in a situation where many professionals risk their lives and are responsible for the lives of many civilians.

RESOURCES

Picture and supporting text.

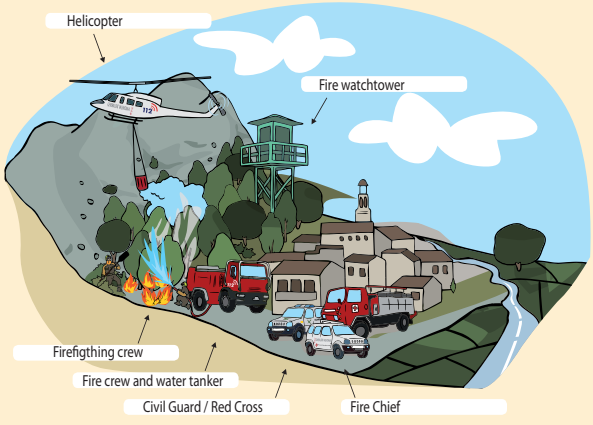
PERFORMANCE

Students should link the texts with each of the firefighting equipment in the picture.

LENGTH

Fifteen minutes.

SOLUTION



Activity 15

To put it out, think

SPECIFIC OBJECTIVES OF THIS ACTIVITY

• To transmit that knowing about fire and forest fires allows us to put them out more effectively, using the appropriate equipment in each situation.

• To learn how and why a fire can be extinguished in different ways.

RESOURCES

Picture and supporting text.

PERFORMANCE

To link each piece of equipment used to combat fires with the element or elements upon which they have an effect.

LENGTH

Thirty minutes.

SOLUTION

- Airplane: heat and oxygen.
- Hose: heat and oxygen.
- Shovel: heat and oxygen.
- Fire beater: oxygen.
- Rake hoe: the fuel (vegetation).

Investigating the causes

GENERAL OBJECTIVES OF THIS SECTION

To transmit the importance of an investigation after a forest fire as a basis to objectively know the causes that started it and to apply this knowledge to forest fire prevention.

Activity 16 Investigating in the forest

SPECIFIC OBJECTIVES OF THIS ACTIVITY

To encourage the observation of situations in nature that might give us useful information about what happened, and how, by observing some clues, we can work out the direction a fire spread.

RESOURCES

Pictures and supporting texts.

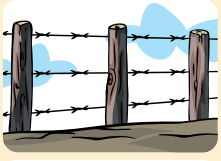
PERFORMANCE

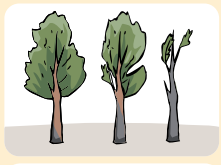
To look at each picture and see the clue that provides evidence that allows investigators to determine from which direction the fire spread.

LENGTH

Thirty minutes.

SOLUTION





How does a forest regenerate itself after a fire?

GENERAL OBJECTIVES OF THE UNIT

To understand, in particular with regard to forest fires, the mechanisms available to vegetation in order to adapt to the conditions or/and changes that occur in the environment where it lives.

To link the great diversity of existing ecosystems around the planet with the adaptation of nature (in this particular case, of the flora) to the specific conditions of the environment they live in (cold, snow, flooding…).

Activity 17 How does vegetation react to forest fires?

SPECIFIC OBJECTIVES OF THIS ACTIVITY

To learn about vegetation's different adaptation mechanisms to fire, in order to regenerate itself after a forest fire.

RESOURCES

Picture and supporting texts.

PERFORMANCE

To link each of the species to the adaption mechanism it has developed to react to forest fires.

LENGTH

Twenty minutes.

SOLUTION

Aleppo pine
(Pinus halepensis)
Spreading their seeds

Holm oak
(Quercus ilex)
Sprouting from a stump

Cade juniper
(Juniperus oxycedrus)
Sprouting from a stump

Mastic tree
(Pistacia lentiscus)
Sprouting from a stump

Rosemary
(Rosmarinus officinalis)
Spreading their seeds

Gorse
(Ulex parviflorus)
Spreading their seeds

Mediterranean dwarf palm
(Chamaerops humilis)
Sprouting from a stump

Activity 18

Helping the forest grow

SPECIFIC OBJECTIVES OF THIS ACTIVITY

To learn about the actions that can be carried out in the forest, after a forest fire, to help its regeneration in accordance with the characteristics of the forest before having been burnt.

RESOURCES

Pictures and supporting texts.

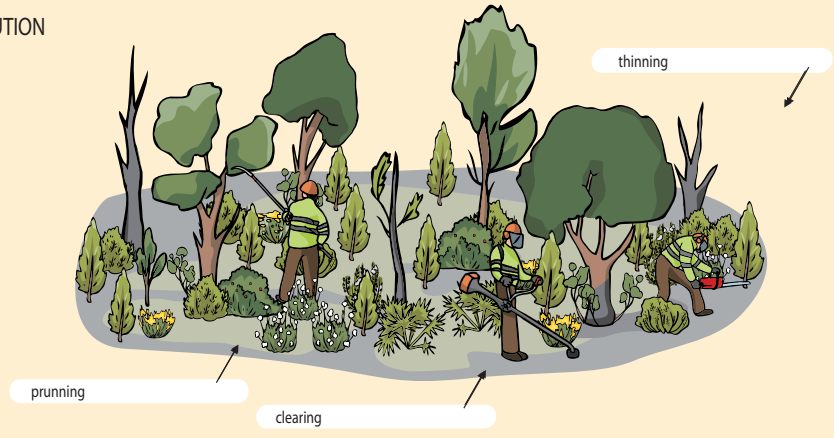
PERFORMANCE

To write down, in the gaps, the name of the task that needs to be done, according to the definitions.

LENGTH

Fifteen minutes.

SOLUTION



NOTES

Even if the forest has its own regeneration dynamics, there are things we can do to help its growth aimed at reducing the plants' competition for light, water and nutrients.

Link this activity to the next to understand that planting is not always the best option, as in this case, where vegetation has spread seeds that will soon germinate and which we might damage with reforestation activities.

Activity 19

Let's plant!

SPECIFIC OBJECTIVES OF THIS ACTIVITY

To learn about the actions that can be carried out in the forest, after a forest fire, to help its regeneration in accordance with the characteristics of the forest before having been burnt.

RESOURCES

Pictures and supporting texts.

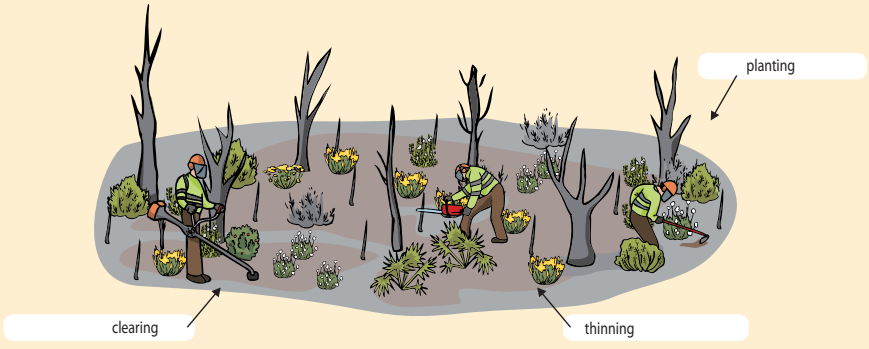
PERFORMANCE

To write down, in the gaps, the name of the task that needs to be done, according to the definitions.

LENGTH

Fifteen minutes.

SOLUTION



NOTES

Present a different situation from the previous activity where the impossibility of vegetation to produce seeds to regenerate trees allows us to think about the option of planting.

Others activities

A day in the country

OBJECTIVES

To learn, in a practical way, that with certain weather conditions the risk of forest fire increases and we must take this into account when doing activities in nature to avoid provoking a fire.

RESOURCES

- www.112cv.com
- Twitter: gva_112cv
- In your council.

PERFORMANCE

Look up on the 112 website (www.112cv.com), in the weather warnings section, the forest fires subsection. In the pull down menu, select the place where the students will spend the day in the countryside. Below, it shows weather information for that day and place. In the associated map, the background colour indicates the pre-emergency level (Level 1- Low-Mid risk; Level 2-High risk; Level 3- Extreme risk) and the lightning icons indicate, respectively, the possibility or the high risk of electric storms.

This information can also be looked up on Twitter: gva_112cv and in the corresponding city council.

LENGTH

Twenty minutes.

SOLUTION

According to the information looked up, we could decide if it is convenient or not to go to the country.

NOTES

On days of extreme risk (pre-emergency level 3), the weather conditions (high temperatures, low humidity, strong winds) and/or social conditions (for instance, holiday periods) increase the risk of forest fires. As a preventive measure, legislation forbids lighting any kind of fire, including the use of camping gas or similar things, and even people and vehicle traffic in paths or forest roads can be limited or prohibited. Even if we are not responsible for the fire, we could be caught in one in the forest.

If we could turn back time

OBJECTIVES

- To develop the ability to synthesise.
- To get students interested in other people's awareness of forest fire prevention.

RESOURCES

Teacher's questions to students.

PERFORMANCE

The teacher asks students to reflect on what they would say to someone who, by throwing a lit cigarette on the floor, has provoked a forest fire, and that it could have been avoided just by putting it out or by not smoking in the forest.

LENGTH

Twenty minutes.

SOLUTION

Each student should include in the answer a summary of all the contents seen until now, where the importance of prevention activities and the responsibility we all have in fighting against forest fires has been highlighted.

NOTES

Activity related to the "Prevention" unit.

The fight against forest fires

OOBJECTIVES

To transmit to the students the idea that the prevention, surveillance and extinction activities addressed throughout the textbook do not work if they are not part of a consistent and coordinated system of actions with a common goal: the fight against forest fires.

RESOURCES

Descriptions of situations seen throughout the book.

PERFORMANCE

With the help of the images shown, the teacher describes some of the situations seen in each of the units for the student to have a global vision of all the activities involved in the fight against forest fires.

LENGTH

Ten minutes.

SOLUTION


Firefighting


Prevention


Surveillance


Surveillance


Prevention


Firefighting


Prevention


Surveillance

NOTES

Activity related to "Prevention" and "Firefighting" units".

The prevention rap

OBJECTIVES

To summarise the concepts learnt in a playful way.

RESOURCES

First verse and chorus:

When we're on picnic, sandwich is our food.
We'll leave the barbecue for when it is cool.
A flicked cigarette, well that's just a sin.
And your rubbish, it goes in the bin.
Because with fire, we don't play.
Natural treasures can burn away!

PERFORMANCE

Once students have finished working with their textbooks, they should write other verses to complete the rap. It can be a group activity and it can also be performed.

LENGTH

One hour.

SOLUTION

Free.

NOTES

Activity related to the "Prevention" unit.

A forest in the classroom

SPECIFIC OBJECTIVES OF THE ACTIVITY

To recreate the effects of ash, produced during a forest fire, on plants' growth.

RESOURCES

Soil, ash, containers and plants.

PERFORMANCE

Get two different containers (they can be tetra brick type or recycled plastic bottles) to plant seeds in. In one of them, we put soil in good condition to sow the seeds and we fill the other one with a mixture of soil and ash from a bonfire. We sow the seeds and, on top of the ones in the second container, we throw a new layer of ash. Once sown, we water them and, after a certain time, we water them again (once a week, so the soil stays wet, but not flooded). Don't forget to make a little hole in the base of the containers to drain away any excess water.

At the beginning of the experiment, a calendar with the tasks is made, in which we write down who is in charge of each weekly watering; each student will make note of his or her observations (in case more watering is needed or signs of illness or plague shows up), and the differences in growth that happen.

LENGTH

This activity begins with the sowing and carries on during the school year with the maintenance (watering) of the plants. The experiment will be over when the size of the plants allows the detection of difference in growth between both containers.

SOLUTION

The plants in the containers with ash grows less.

NOTES

After a forest fire, the fertility of soil can increase during the first moments from two to ten times its initial value. However, most of the nutrients incorporated after the fire get lost after a year because these nutrients are more soluble in the ash and disappear from the soil with the first rains. This effect is reproduced in the container with soil and ash when we water the plant regularly.

Activity related to the "Mediterranean forest" unit.

Exhibition boards/murals in the school

OBJECTIVES

- To get students interested in other people's awareness of forest fire prevention.
- To develop the ability to synthesise when working on the mural.
- To encourage the ability to speak in public.

RESOURCES

This activity allows using different resources to create the mural, so it is a free design (cardboard, colours, cut-outs…).

PERFORMANCE

Once students have completed their textbooks, each of them creates a mural about the things they have learnt to create an exhibition in a common area of the school.

Students should explain what they have learnt to other classes, years or even to teachers and parents by using the murals (similar to display panels in conferences). There is not a particular day or time for the exhibition, but, during breaks, at the start or the end of the school day, students should get involved and try to explain the content of the mural to other students.

LENGTH

Up to the school (a minimum of two weeks is recommended).

SOLUTION

-

NOTES

Activity related to all the units.

Exchange with other schools

OBJECTIVES

To share the new knowledge and to exchange experiences with students from other schools in the Valencian Region, in other regions and even in other countries.

RESOURCES

Schools; blogs, email, social networks; student's exchange visits…

PERFORMANCE

Contact a school to present the 'twinning' proposal and, using the chosen means, create a platform for the exchange of information between the students of both schools.

LENGTH

It could be carried out in parallel to the other activities of the textbook and could last for the rest of the school year.

NOTES

Activity related to all the units.

Visiting an area affected by a recent forest fire

OBJECTIVES

To learn, in situ, about the consequences of forest fires in nature and in affected villages.

RESOURCES

-

PERFORMANCE

The idea is to visit a forest area in good condition and a different one that has been affected by a forest fire, with the collaboration of an environmental officer. The visit would extend not just to the forest area, but also to the affected crop areas, houses, etc., and above all to the village where appointments could be set with:

- the council, which has technical information about firefighting activities and available data of the fire (date, weather conditions, burnt area, type of burnt area…).
- the school, where students can relate their experiences during the fire to the visitors.
- the retirement home, where interesting stories might arise.
- students could undertake a field survey in the streets. Finally, back at the school, they could pool together their experiences and the information collected.

LENGTH

Up to the visit's organiser.

SOLUTION

-

NOTES

Activity related to the "The Mediterranean forest" unit.

Visiting the Provincial Firefighters Consortium centres

OBJECTIVES

To get to know, in situ, some of the personnel and equipment used in forest firefighting.

RESOURCES

The resources available in the centre to visit.

PERFORMANCE

Example: Request an appointment at http://www.bombers.dva.gva.es/

LENGTH

Decided by the centre.

SOLUTION

-

NOTES

Activity related to the "Firefighting" unit.

"1-1-2 Valencian Region" informative talk

OBJECTIVES

The Centre for the Coordination of Emergencies in the Valencian Region (CCE, in Spanish) provides this service to let people in the Valencian Region, in general, and to certain groups, in particular, know, not just about the main characteristics and functioning of the Single Emergency Number, but also to highlight the good use of it that must be observed.

RESOURCES

Informative talk given by the CCE personnel, who go to the school.

PERFORMANCE

Set an appointment with the CCE personnel by filling the form available in:
http://www.112cv.com/ilive/srv.112CV.ConoceEl112

LENGTH

One hour.

SOLUTION

-

NOTES

Activity related to "Prevention" and "Firefighting" units.

SOLICITUD PARA CENTROS EDUCATIVOS,
DE CHARLA DIVULGATIVA "1-1-2 COMUNITAT VALENCIANA"

Centro Educativo: _____

Persona de Contacto/ Cargo:

_____

Dirección del Centro -donde se impartirá la charla-:

_____

Teléfono: _____ **Fax:** _____ **E-mail:** _____

Propuesta de fecha: _____ **de** _____ **de 20__**

Propuesta de hora: _____ **horas.**

Nº de asistentes TOTALES: _____ **Nº de charlas a impartir:** _____

CURSO	Nº DE ALUMNOS	EDADES

- Las Charlas se realizan en horario de mañana y/o tarde, siendo en todo caso necesario confirmar la disponibilidad
- La duración aproximada es de 1 hora.
- Una vez cumplimentada la solicitud, debe enviarse por fax al número 962759073 o al correo electrónico: 112cv@112cv.com.
- Si no fuera posible realizar la charla en la fecha u hora propuesta, "1-1-2 Comunitat Valenciana" propondrá una fecha alternativa.
- Las charlas son por grupos, siendo necesaria una asistencia mínima.

Practice drill of an emergency call to 1-1-2

OBJECTIVES

To become familiar with those situations where it might be necessary to call 1-1-2, and the protocol followed by the service to confirm the emergency and to answer the call correctly.

RESOURCES

A telephone or something that might simulate one. Pen and paper.

PERFORMANCE

Step 1.

Students are divided into pairs and prepare the activity: each pair chooses a situation where it is necessary to call 1-1-2. Then they write down the questions that the emergency personnel would ask and the answers given by the person calling:

- ABOUT THE PLACE
- ABOUT THE EVENTS
- ABOUT INJURED PEOPLE
- TO PROVIDE A PHONE NUMBER

Step 2.

In front of the rest of the class, each pair performs the emergency call: one student would play the role of the person working in the 1-1-2 service and the other one would be the person involved in the emergency who makes the call.

LENGTH

One hour.

This activity could be carried out after the visit to the Centre for the Coordination of Emergencies or after the informative talk given by the centre's personnel.

NOTES

On the Emergency Number 1-1-2 website, the following instructions to make an emergency call are provided:

• The 1•1•2 number is only and exclusively for emergency calls.

• It is not a general information line nor a number for information about weather or road conditions.

• Providing position: you must give as much information as possible so we can locate the incident.

• Answer all the questions made by the operator: the information requested is crucial for the emergency and safety personnel.

• Provide your phone number: so we can contact you again in the event communication is interrupted.

• Try to stay calm and provide all the information in a clear, concise and objective way.

Card games: families

OBJECTIVES
-

RESOURCES
Cardboard, pencils, colours and scissors.

PERFORMANCE
Decide the different topic groups and the cards belonging to each one. For instance, it could be five groups of six cards each:
• Benefits of the forest / fire consequences: clean river- clean atmosphere- trip to the country- forest with animals/ dry river- smoke- fire and animals running away – burnt forest.
• Fire and fires / causes: oxygen – fuel – matches / agricultural burning – firecrackers – cigarettes – lightning.
• Prevention: fire lookout – eating packed food in the forest – rubbish to the bin.
• Firefighting: firefighter - airplane - tools - helicopter – fire truck- fire flapper.
• Vegetation / Mediterranean forest's animals: holm oak – Mediterranean dwarf palm – Aleppo pine / wild pig – hare – eagle.
Cut out the cardboard in card shapes and draw on each one an element, such as those named above, with the help of the pictures in the textbook.
In this case (five groups of six cards each) the number of players can be from two to five.
Each player gets five cards and the rest of them remain face down on the table (to draw). Each player organises their cards to decide which group to complete. The one who is first to play asks another player if he or she has a card of his/her interest. If the other player has it, he or she will have to hand it over. If a correct request is made, this gives the player who made the request the right to play again. If an incorrect request is made, the first player has to draw a card from the deck. If the player gets the card they needed, he or she can play again, if not, the turn passes to another player and so on. Once there are no cards on the table, the game goes on until all the groups are completed. The player who completes more groups wins the game.

LENGTH
Two or three sessions of an hour to make the cards.
One hour session to play in groups.

SOLUTION
-
NOTES
Activity related to all units.

SOM prevenció