WITH FIRE WE WON'T PLAY TREASURES CAN BURN AWAY

FOREST FIRE PREVENTION IN THE VALENCIAN REGION







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ntroduction

If we watch the news,
especially in the summer, we will hear
reports about forest fires which occur both in the
Valencian Region as well as in the rest of Spain. These
fires burn our forests and endanger the lives of animals
and humans.

Watching from home, and through the television's screen, fires can seem somewhat distant and that there is little we can do to prevent them. But this is not the case!

Have a look at the activities in this book to learn about forest fires, and everything that is in our hands to prevent them from happening.



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.

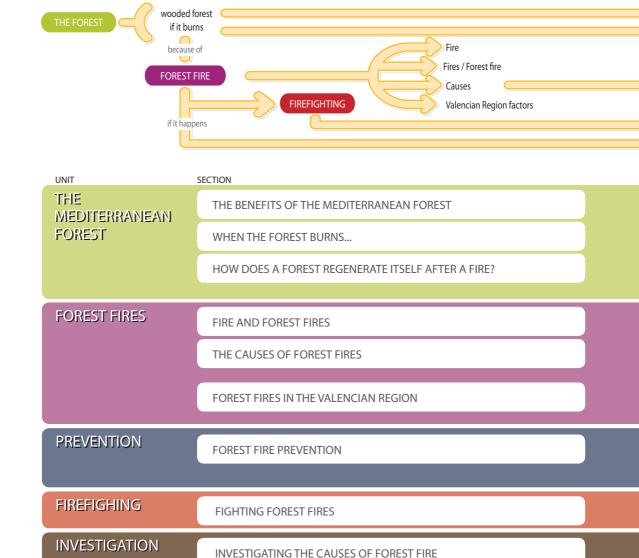
It is with this aim that the Regional Ministry of Government and Justice, supported by Red Eléctrica de España, publishes this educational guide made up by a Teacher's Book, a Student's Textbook and a mobile application which provides highly useful materials for training and raising awareness of forest 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

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ANNEXES



FOREST FIRES IN THE WORLD

1-1-2, THE EMERGENCY NUMBER

PROTECTING NATURE, YOU PROTECT YOURSELF



The benefits of the **Mediterranean forest**

The wooded areas of our planet (forests, jungles, riversides, bushes, dunes...) are highly valuable to society because they fulfil ecological functions which are vital for life to exist on Earth. They also provide us with economic and social benefits.

In Spain we have a large, and varied, number of wooded areas (it has the second largest forest area in the European Union) and we call them FORESTS. There are many kinds of forest, some have trees and some do not; have a look at the following examples:









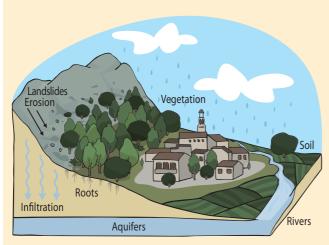


Shrubland in the Sierra de Mariola



The forest's treasures

If you read the following text, you will learn about the benefits that our forests contain. But watch out, some of the words are missing, and you will have to fill in the gaps with the help of the pictures.



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

Bicycles

Landscape

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



Many other people generate their income from the forest because they may have a hotel, a farmschool, a campsite...or because they sell products which come from the forest (

...).

When the forest burns...

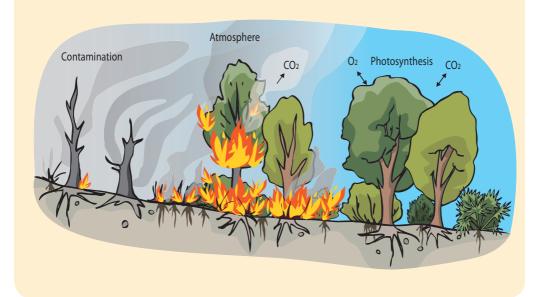
A fire is one of the worst things that can happen to a forest, as it profoundly changes, for a long period of time, not only the vegetation, but also the soil, the watercourses and even the climate of the area. After a fire, all the living creatures, as well as humans, suffer the consequences.

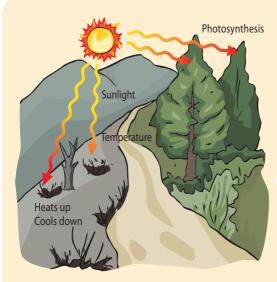
When the treasure is stolen from the

As you did in the previous activity, look at the diagrams to be able to fill in the gaps, and you will learn about what happens when vegetation is lost from the forest.

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

This happens because a large part of the that exists in the is generated by plants . Many living creatures use this oxygen (O₂) to breathe. Plants also take in the air, reducing the amount of this gas in the atmosphere, which is one of the gases responsible for





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

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

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



Fire and forest fires

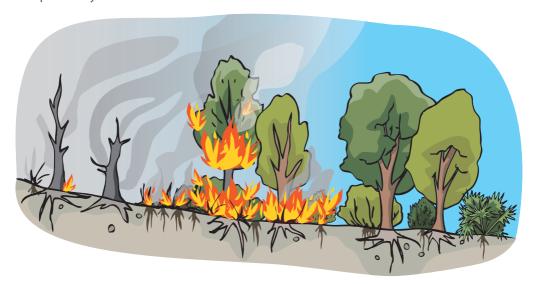
Fire occurs when heat is applied to a fuel in the presence of air (oxygen). The process which produces fire is called combustion and is a reaction that releases energy (heat) and emits light (the flame).



Humans learnt to use fire thousands of years ago: initially they lit their flames by hitting two stones together or by rubbing two pieces of wood, and it was used for cooking, heating, light and defence...



However, fire can be very dangerous if it spreads in an uncontrolled manner. When this happens it is simply called fire. When fire extends through a forest, burning the vegetation, it is specifically called 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

Forest fires can occur naturally or they can be started by humans.



Natural causes of forest fires

A forest fire can occur naturally because a volcano erupts or due to a lightning strike. Which of the two causes cannot occur in the Valencian Region?

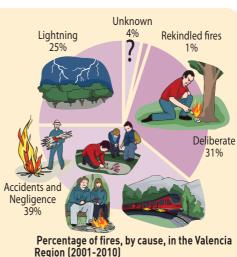




e causes of forest fires in the lencian Region

Look at the graphic on the right and fill in the gaps.

- % of forest fires are caused by nature and are started by
- % of forest fires are caused by humans, the majority of which are started by

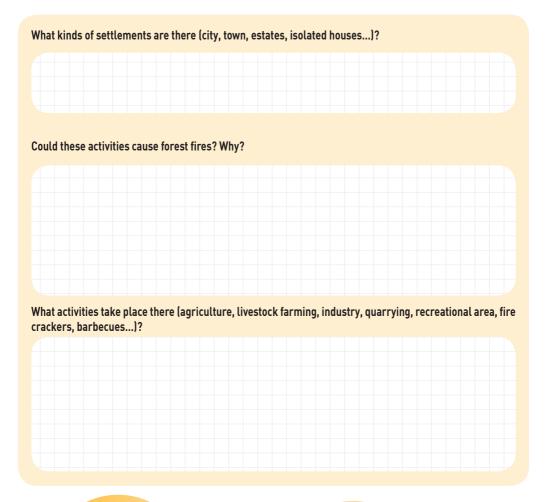


Find the meaning (on the internet or in a dictionary) of the word NEGLIGENCE and describe, with the help of the pictures, some of the activities where we use fire that can cause forest fires.	
Can you think of any more?	

Find Find the causes within surroundings

Think of a place you know well in the Valencian Region (your town, the town of a friend or family member, a Nature Reserve, a recreational area, the beach...). Draw this place and describe it.

What are the surroundings like (built up, crops, forest, beach...)?



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).



Forest fires in the Valencian Region

In some parts of our planet, such as in the Mediterranean, forest fires have always been a part of nature. This is due to the climate, the relief, the vegetation and human activity.

In the Valencian Region, the CLIMATE is Mediterranean, and is characterised by long, hot and dry summers. During this season, it is easy for a lightning storm or human neglect to start a fire in a forest or its surroundings. As the vegetation is dry, due to the lack of rain, it burns easily and fire spreads very quickly though the forest, especially if it is windy.





In the Valencian Region,

- the area with the highest number of lightning strikes is Morella?
- coldest the are areas the elevated areas οf 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?





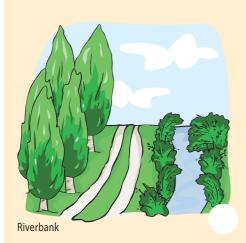
Which of the following situations are likely to provoke a forest fire?



Westerly winds in the summer



Rainy day





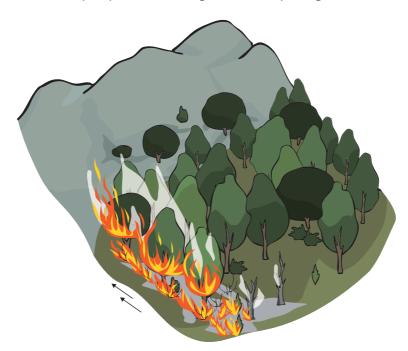
Area with dry vegetation due to drought

THE **RELIEF** of the Valencian Community is very varied. Along the coast the land is very flat and there are many beaches as well as cliffs. Inland, however, there are mountains.

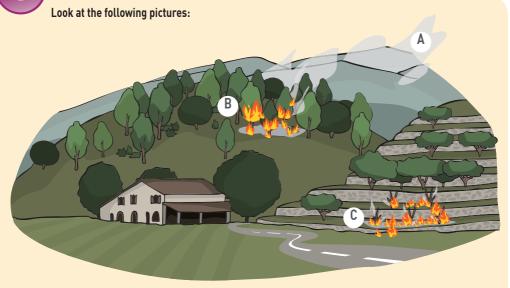


In mountainous areas, forest fires are more common because they have more vegetation.

The relief affects the speed of the fire: it spreads more quickly when it travels up the side of a mountain. Also, steep slopes make finding the fire, and putting it out, more difficult.







Where are we more likely to spot a forest fire? Where would it be easier to put it out?

- A. Between high mountains.
- **B**. In the forest.
- **C**. In the flat agricultural lands near the road.

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, strong winds or avalanches.

On many occasions, we, HUMAN BEINGS, alter this dynamic degrading the forest by transforming the vegetation into a dense mass of very similar and highly flammable plants which helps fire spread quickly.

How fire spreads through forests

Look at the pictures and read the texts carefully. Write down, next to each text, the letter of the picture it refers to.



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 fire spreads easily through it..

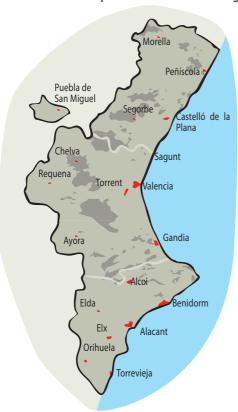


In this forest, its managers have removed the shrubs and some trees to allow grass to grow; the trees are tall and grow with enough space between them. If there were a fire, it would be harder for the fire to spread from the grass to the trees or between the trees because there is not continuity in the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



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.

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.

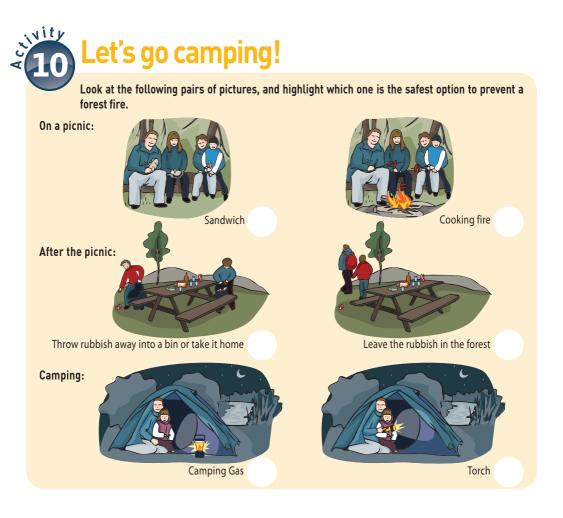
Did you know that the majority of fires are caused by humans?

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

It is easier to know how to avoid forest fires if we know what causes them and the factors that contribute to them. All the measures and actions that are used to prevent forest fires occurring are called FOREST FIRE PREVENTION.

Many professionals work in forest fire prevention, by watching the land or looking after the forest. They also teach us how we should use fire and how to behave in nature.







REMEMBER!

Only pitch your tent in an authorised area and with a required permit (you should request this seven days before).

You can only light a fire in those places that have been set up and authorised for this purpose (for example, an authorised barbecue or "paellero").

You can look this up visiting:





gva 112cv • Your council www.112cv.com



The careful architect

Imagine you are an architect, and you have been asked to design a country house in the forest. As you are aware of how dangerous a forest fire can be, you want to design it with two main objectives: it should be safe for its owners in the event of a forest fire in the surrounding area and it should also prevent them from starting a dangerous fire.

Using the following clues, place each item in its correct place (within the white dotted lines):

- Inflammable items (diesel, gas, wood...) should be placed in an area with little vegetation and away from direct sunlight.
- The swimming pool and the hose could be very useful for the firefighting crew, place them where access is easy.
- The barbecue should be placed away from vegetation and other inflammable items.



On many occasions the main problem is that forest vegetation is continuous and homogeneous and, therefore, it is very easy for fire to spread through the forest, even putting in danger houses found inside the forest. In these cases, we can reduce the amount of vegetation, making it harder for the fire to spread. PREVENTIVE SILVICULTURE is the name given to these activities.

Protecting the forest you protect yourself

Look at the following pairs of pictures. Write down in the first picture, and in the correct place, the action needed in order for the vegetation to look like it does in the second picture.

Pruning: cutting the lower branches of the trees.

Thinning: chopping down some trees. **Clearing:** remove some of the shrub.

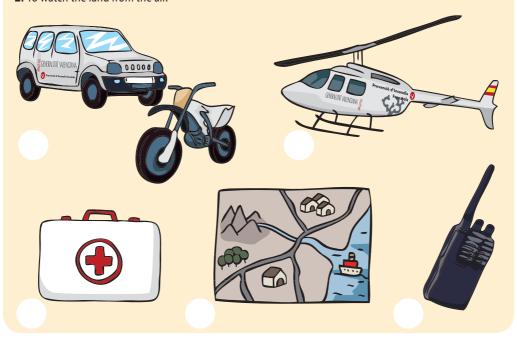


If you are in the forest, you might come across some of the people who work in forest fire prevention: prevention patrols, forestry brigades, environmental agents, police (local and regional)... even a helicopter. These professionals' SURVEILLANCE activities are very important, and they are called "fire lookouts". They know the forest very well and how to behave in it. They are also on the look-out for any forest fire they might see. To be able to watch over large areas, they move around in off-road vehicles, on motorbikes, have binoculars...

What is it used for...?

Look at these pictures and read carefully each of the situations where you might find a fire lookout. Write down the letter which describes best the picture.

- **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.



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.



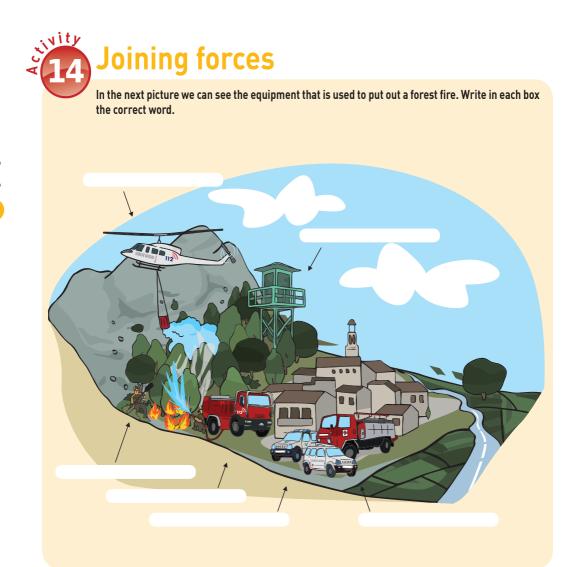
REMEMBER!

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).



Fighting forest fire

Despite all the prevention methods we have seen, sometimes, forest fires still occur. When this happens, a large number of people and equipment are mobilised to put it out.



Water tanker: it is an off-road truck that has a tank filled with water and a hose that is handled by the fire crew and which shoots water at the fire.

Firefigthing crew: these are the people who control and put out the fire using different tools.

Fire Chief: the person who coordinates and distributes the firefighting equipment during the fire.

Fire watchtower: from here a person can view the area of the fire and pass on information to the Fire Chief.

Civil Guard and Red Cross: they are in charge of controlling the access to the fire and any medical incidents, attending the people involved in the firefighting operation, respectively.

Helicopter: can transport crews and drop large amounts of water into the most dangerous areas of the fire.

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.

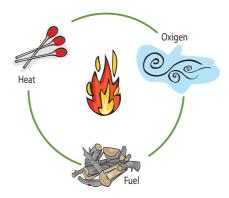
REMEMBER!

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.

Normally, we believe that fires can only be extinguished using water, but, if we think about it, there are other ways of doing so. Remember the definition of fire on page 12, where we saw that three elements were necessary to start a fire; this can be shown as the figure on the right:

If we want to put out the fire, all we have to do is eliminate one of the three elements, using the following methods:



- · Covering the fire with another material (water or earth) to prevent air (oxygen) coming into contact with the flame and to reduce the ambient and vegetation's temperature.
- Removing or isolating the vegetation (the fuel) to prevent the fire from spreading.

To put it out, think

Now that you know what to do, link each piece of equipment used to combat fires with the element or elements upon which they have an effect.



Aeroplane:

it fills up with water from a reservoir, a lake or the sea to release it onto the fire.





Water tanker:

using the hose, a firefighter aims the water that is stored inside the truck at the fire.





Shovel:

it is used to throw earth onto the flames or onto the vegetation.





Fire beater:

it is used to smother the fire by hitting it forcefully.





Rake hoe:

it is used to manually remove vegetation.



Investigating causes

After a fire it seems, to the untrained eye, that all that is left are ashes. But there are still clues



The study of these clues, in order to answer these questions, is called the INVESTIGATION OF CAUSES. A specialised team of environmental agents, called the "Operational Group of Forest Fire Investigations", along with the Civil Guard and Regional Police, is the team trusted with answering these questions.

Did you know...?

The investigators "know how to read the path written by the fire" (F. Tejedor) in the stones, in the vegetation... using different pieces of equipment, such as:

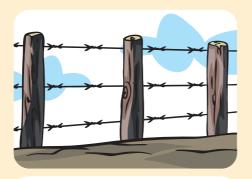
- Markers: these are small flags, either red, yellow or white coloured, which are placed on the ground to indicate the direction the fire spread and to determine the point of origin.
- Lupas: Magnifying glass: to be able to look at smaller clues.
- Metal detectors: to be able to find metallic objects such as a lighter...
- Imanes: Magnets: to find small fragments of metallic objects.
- Cameras: to take pictures of the scene, which might be altered over time, for example, following rain, winds...



Investigating in the forest

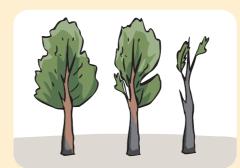
Looking at the following pictures, work out the direction the fire spread.

As we saw in the section "Forest fires in the Valencian Region", fire spreads depending on the vegetation's characteristics, the relief, the wind... and leaves behind burnt elements (vegetation, stones, fences...) that can show us the direction the fire spread, and can even tell us the exact point of origin.









How does a forest regenerate itself after a fire?

A forest's vegetation can adapt to changes, be these natural or man-made. In the Mediterranean, vegetation is well adapted to the conditions of its surrounding, such as fire and the lack of water. This means that, after a fire, nature can regenerate itself.

There are plants that protect themselves from fire with a thick bark over its trunk, or covering the trunk with a robust material, without any cracks, which acts as an insulator (such as cork from a cork oak), allowing the tree to survive fires almost unscathed.





Other plant species use the heat from the fire to spread their seeds. For example, the pine cones from pine trees normally explode with fire, spreading their seeds everywhere. Also, the thick skin of the seed provides good protection from fire, allowing it to germinate shortly after the fire. Other examples are the gorse, rosemary or the rockrose.

Numerous plants in Mediterranean forests have the capacity to sprout from a stump, that is to say that they can grow again because they produce new sprouts at ground level, such as the holm oak, the juniper plant, the Mediterranean dwarf palm, the mastic tree or the Mediterranean buckthorn ...





How does vegetation react to forest fires?

Link each species to the adaptive mechanism it has developed to react to forest fires.





Holm oak (Quercus ilex)



Sprout from a stump



Mastic tree (Pistacia lentiscus)

Spread seeds

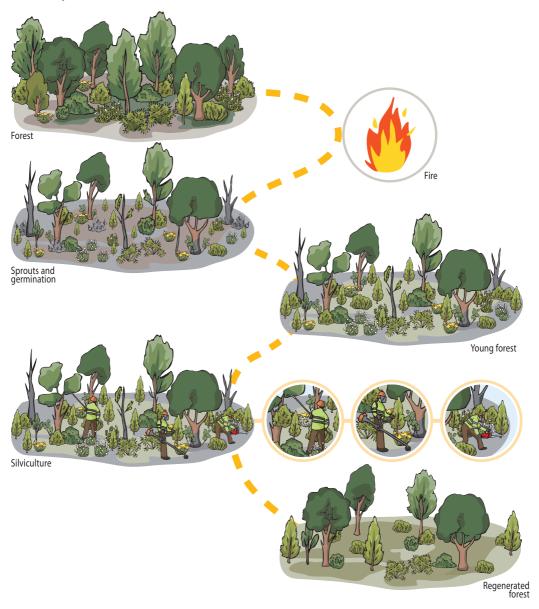








Gorse (Ulex parviflorus) You have learnt about the mechanisms available to vegetation to recover from a forest fire. But you should also know that a forest burns in just a few hours, but takes many years to become a mature forest again. So long (over one hundred years), that we will never get to see it fully recovered.





Helping the forest grow

There has been a fire in the forest. After the fire, many pine seeds have germinated and there are a large number of trees growing, on top of those that managed to survive the fire. Write down in each box, in the picture below, what you would do to help the forest grow again so that it will look like the forest in the second picture.

PRUNING: cut the lower or damaged branches of the tallest trees in order to favour its vertical growth.

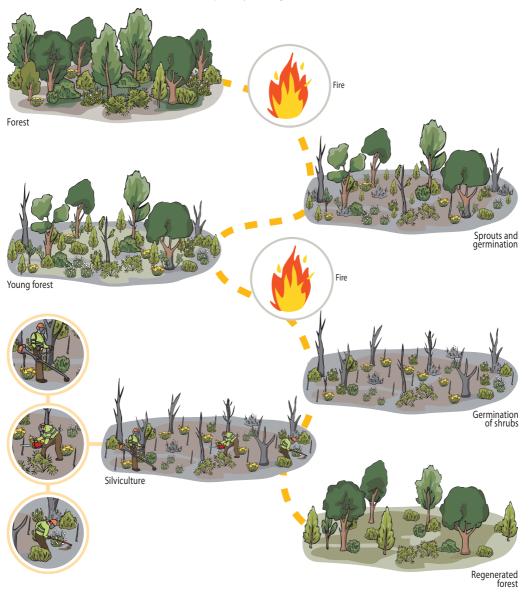
THINNING: remove the smallest, diseased or malformed trees to promote the growth of the healthiest ones in order to create a healthy and mature forest.

CLEARING: reduce the amount of shrubs around the trees that remain in order for these to have more nutrients and water available.





You have learnt how a forest recovers, bit by bit, after having been burnt. However, whilst it is recovering it is still very fragile and any disruption might damage it further. This happens, for example, when a pine forest burns repeatedly: those trees are not yet mature so cannot produce the seeds needed to create the new generation of trees, and only the shrubs, which can create seeds much more quickly, will grow.



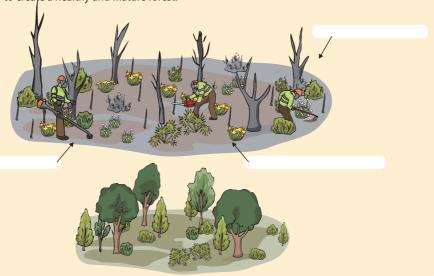
Let's plant!

There has been a fire in an area that was burnt a few years ago. The trees have not had enough time to produce seeds, and the only thing that grows are shrubs. Write, in the first diagram, what you would do to help this forest regenerate and have the same aspect as the second picture.

PRUNING: of the shrub in order to free up space to be able to plant trees, and for these trees to have more water and nutrients available.

PLANTING: in order for there to be trees again in this forest.

THINNING: remove the smallest, diseased or malformed trees to promote the growth of the healthiest ones in order to create a healthy and mature forest.

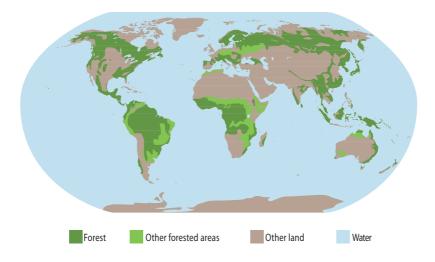


Did you know...?

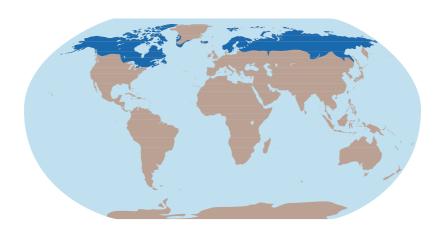
The 31st of January is the "Day of the Tree" in the Valencian Region? There are many outdoor activities organised for this day in order for us to get to know the different scenery in our region, which we can all help regenerate by planting trees. If you want to know more, you can find further information on the Regional Ministry for the Environment's website, which organises activities in collaboration with the Environmental Education Centre of the Valencian Region, or with Nature Reserves, etc.

Forest fires in the world

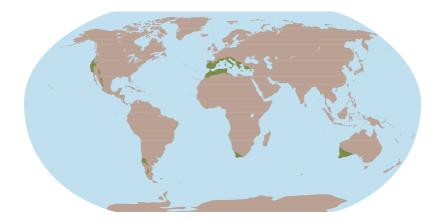
Forest fires occur in the rest of Spain as well as in many other parts of the world where there are forested areas, and similar to the fires in the Valencian Region, are either man made or a product of nature.



Fires caused by lightening in the forests of Russia, North America, Canada and Northern Europe are frequent and usually burn large areas of land.



In those areas with a Mediterranean climate like ours (the rest of Spain, the other countries that surround the Mediterranean, California in the United States, some parts of Australia and China), forest fires are frequent and the majority are man-made.



In other parts of the world, such as Central America, the Amazon, South East Asia, South Africa... large areas of forest are burnt in order to create grazing land for animals or to plant



When you go travelling, ask about forest fires. You'll surely find out something interesting!

Protecting nature, you protect yourself

REMEMBER!:



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:





gva 112cv

your council

What you need to know about



Call 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.

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.

Do...

- 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.

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.

Your notes

