

Rural Training Center – Thailand (RTC-TH)



**Community-based Environmental Education
for the Self-sufficiency and Sustainability of
Small Rural Family Farms**



Wildfires

Photo from the Internet; educational fair use clause



An Emergency Preparedness Training Series presentation



Rural Training Center-Thailand
Emergency Preparedness Community Service Program

Ready to serve and sustain our community

For other lessons in the series e-mail rtc2k5@gmail.com

www.neighborhoodlink.com/org/rtcth

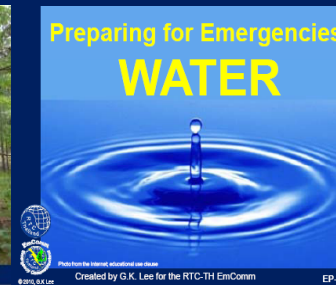
The EP Lesson Series



EP-1



EP-2



EP-3



EP-4



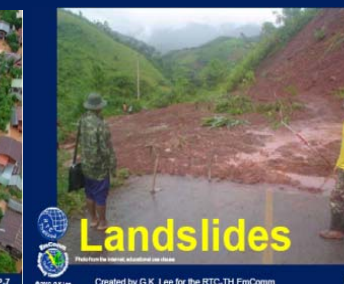
EP-5



EP-6



EP-7



EP-8



EP-9



EP-10



EP-11

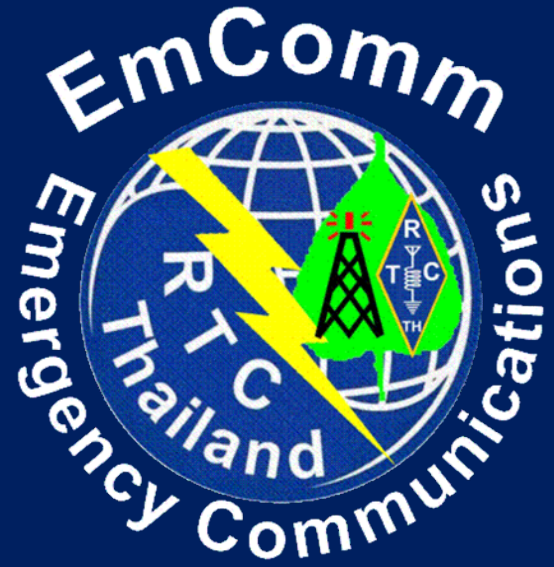


EP-12



A part of the RTC-TH EmComm Program

The Rural Training Center-
Thailand Emergency
Preparedness program is a
community service effort to
provide emergency



Preparedness training for local
community self-sufficiency and
sustainability in times of need.



The Rural Training Center-Thailand (RTC-TH)

is an all volunteer
organization providing
community-based
environmental education
for self-sufficiency and
sustainability of small
rural family farms

www.neighborhoodlink.com/org/rtcth

E-mail: rtc2k5@gmail.com



The lessons were adapted from existing RTC-TH REEEPP program lessons

Unless otherwise indicated, photos in this presentation are the exclusive property of the RTC-TH. Use of RTC-TH copyrighted materials are available for private / non-commercial educational use without written permission if no changes are made, no fee is charged, and proper attribution is made to the RTC-TH.

Commercial use of the materials is prohibited without written permission.



E-mail: rtc2k5@gmail.com
www.neighborhoodlink.com/org/rtcth

REEEPP

Rural Environmental Education Enhancement Pilot Program



An innovative, non-traditional community-based environmental education program integrating math, science, geography, English language, and technology lessons for environmental stewardship using interactive experiential learning in outdoor settings at Ban Na Fa Elementary School, Nan Province, Thailand.





The Rural Training Center-Thailand was created to honor the life and memory of Mr. Tang Suttisan, a father, farmer and former custodian of Ban Na Fa Elementary School who appreciated and valued education.





What is a Wildfire?

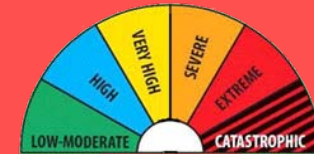


Photo from the Internet; educational fair use clause

A wildfire is fire burning out of control in a natural area. A natural area is a place with few people or few buildings.





Natural Areas and Fires



Photo from the Internet; educational fair use clause

A forest is an example of a natural area.
A forest fire is an example of a wildfire.



Global Warming & Climate Change

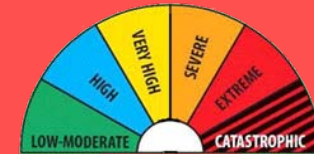
In the near future, Nan Province, Thailand may have dry seasons that are hotter, longer, and drier than before. These conditions can increase the number of wildfires in Nan Province. The rainy season will be shorter, but the rains may be more intense than before.

Learn about wildfire now so you know how to reduce the risk of wildfires.

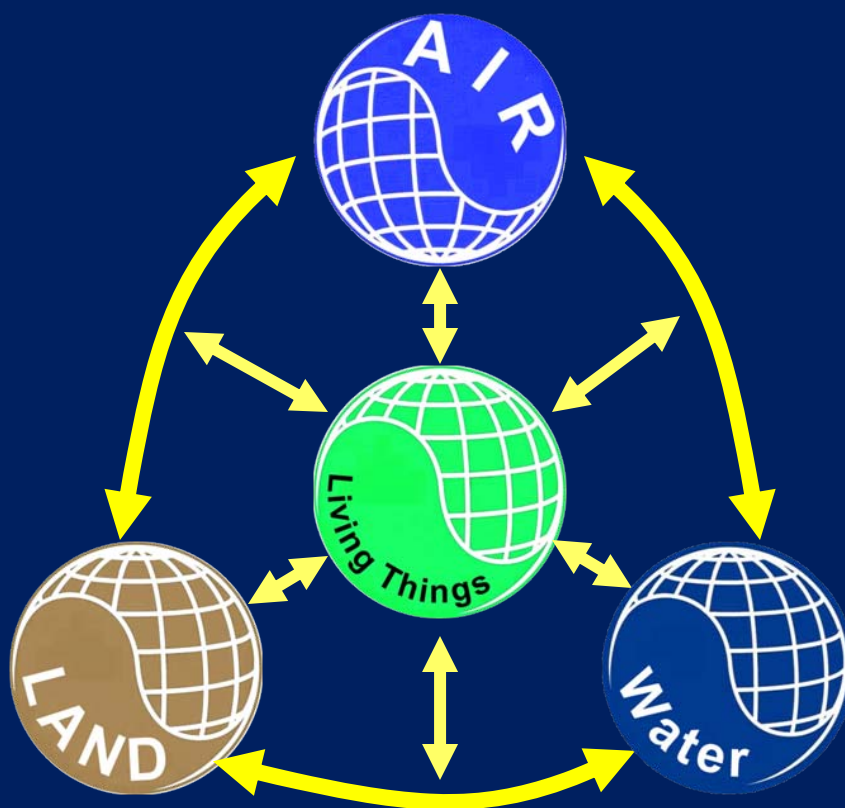




Learning about Fire



Location Scale Time



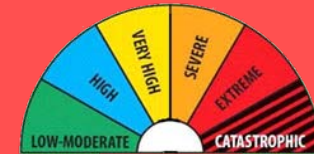
Fire is not a living thing. But it has a “habitat.”

You can use the Geographic Systems Model to learn about wildfires.





Location



Most wildfires occur on land in natural areas covered by dry vegetation.

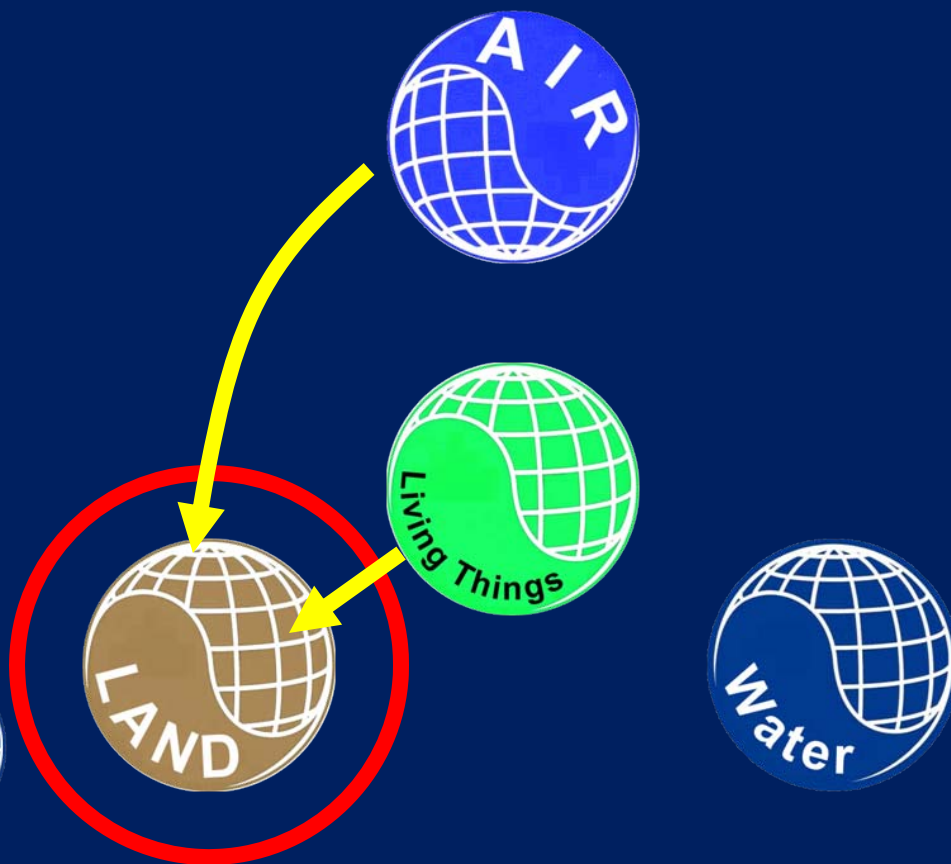




Wildfires occur on land.

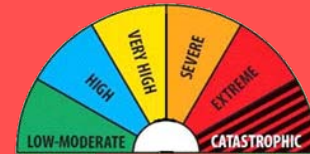


Land is where air can easily mix with living things. As living things dry out, it is easier for them to burn.





Scale

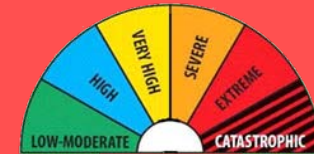


Wildfires start
at a point
location and
can spread to
cover
thousands of
rai of land.

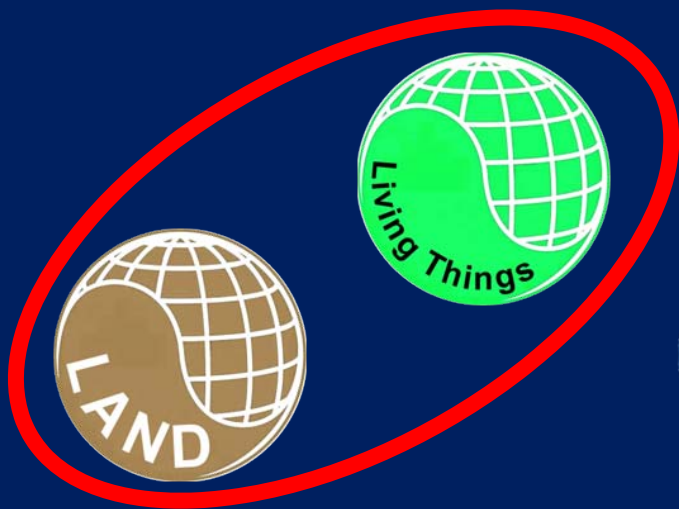




Time

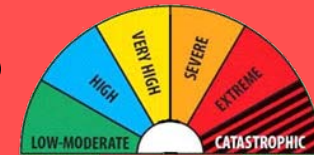


Wildfires can occur at any time of year, but most occur in the dry season. How fast the fire grows depends on a number of factors.



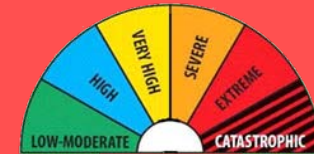


When do fires occur in Nan?





Weather and Fire



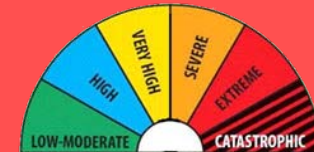
There is an increased danger of wildfires when vegetation is dry because:

- Temperatures are high
- Rainfall is low
- Relative humidity is low
- Winds are strong





Fire and Climate



From North Thailand Climate Data During 54 years (1951 - 2004)

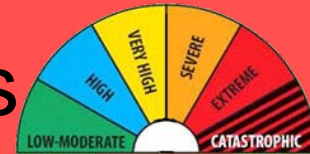
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Trop Cyclones	-	-	-	-	5	2	9	17	23	15	1	-	72
Seasons	Winter	Summer				Rainy (SW Monsoon)					Winter (NE Monsoon)		
Ave Temp	23.1°C	28.0°C				27.3°C					23.1°C		
Temp Range	17.1-30.8°C	21.4-35.8°C				23.7-32.2°C					17.1-30.8°C		
Ext Temp	0.8°C	44.5°C									0.8°C		
Rainfall (mm)	105.5	182.5				952.1					105.5		
Thawangpha Rainfall (mm)	11.0	12.6	29.2	108.0	206.2	202.4	244.1	302.3	175.6	80.4	22.7	5.9	1400.04
Rel Humidity	Low		Lowest (av 60%)			Highest (av 82.8%)					Low		Av 74.4%

- Summer season is the prime fire season for Nan; temperature is high, rainfall and humidity are low.
- Hunters are in the forest lighting cooking and camp fires.
- Farmers are starting to clear land by burning the weeds and brush.





Many farmers use fire to clear fields





Three Basic Needs of Fires



Every fire needs air, fuel, and heat.



Air comes from the atmosphere and lithosphere.

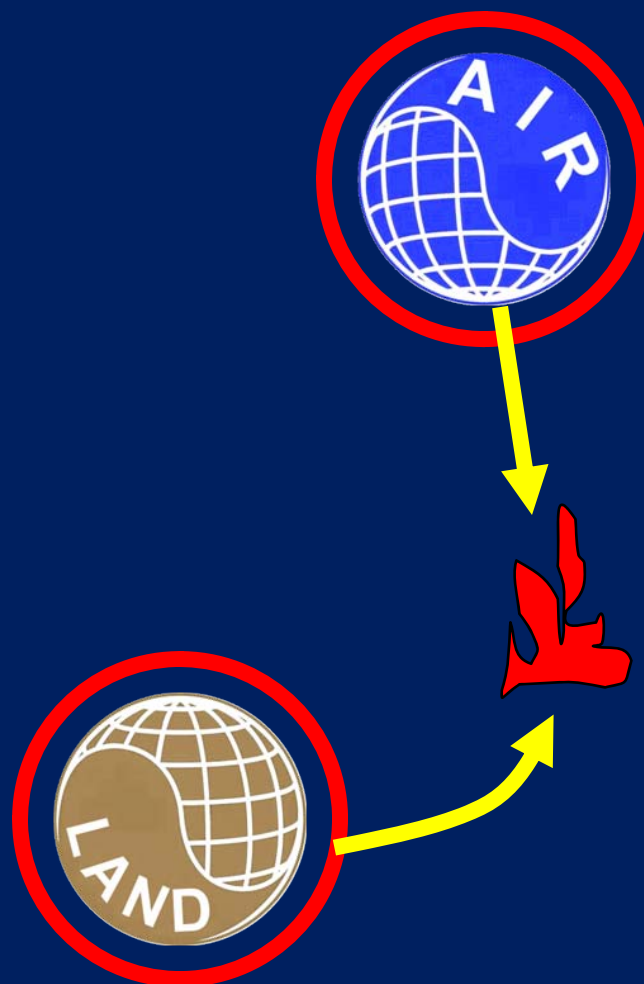
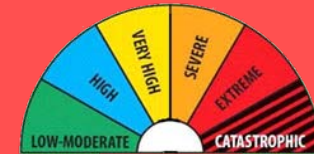


Fuel comes from living things or the biosphere.





Air Sources



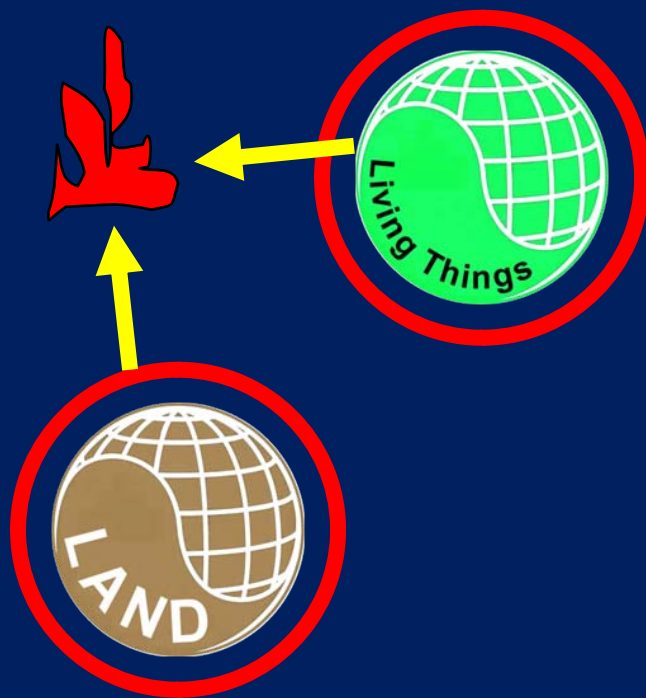
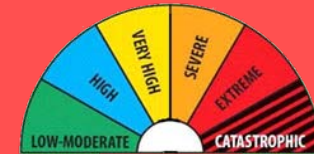
Air comes from the atmosphere in the general area of the fire.

A small amount of air comes from the spaces between the soil particles.





Fuel Sources



Fuel comes from living things (or the biosphere) as well as organic materials in the soil.

Soil without significant amounts of organic materials to fuel fire is called “bare soil” or “mineral soil.”





Heat Sources

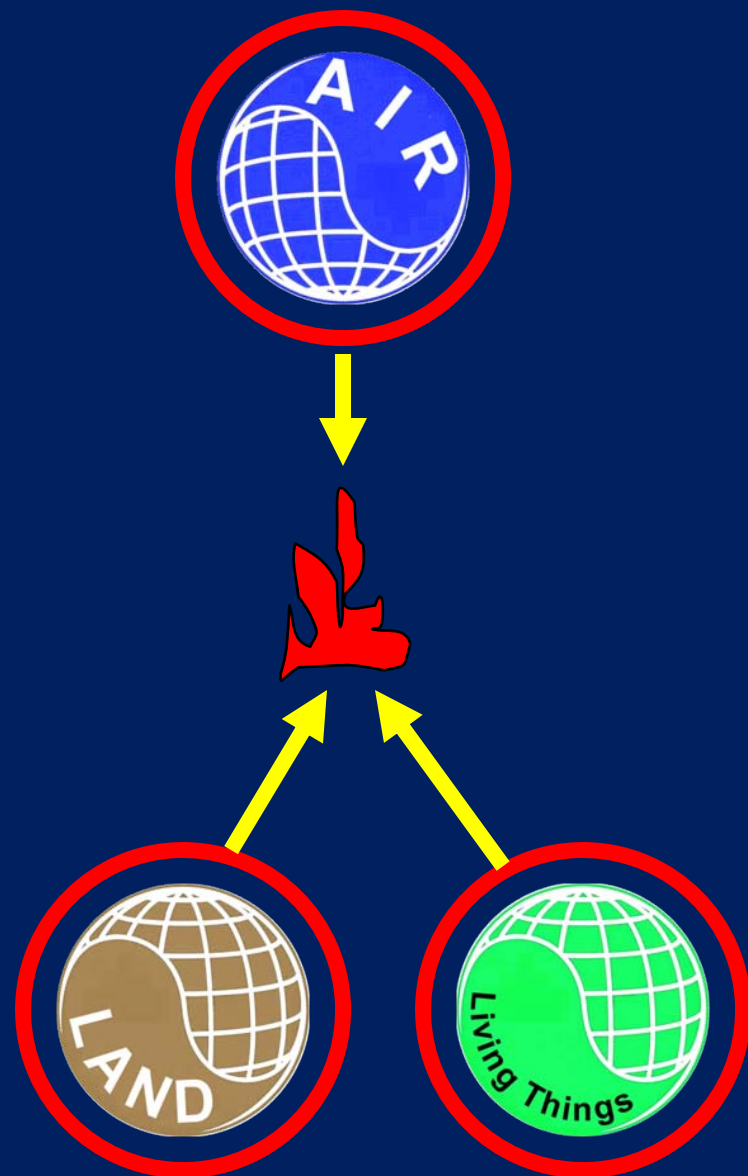


Heat can come from different places:

Lightning or sunlight from the sky.

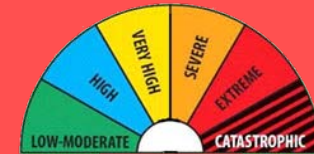
Volcanic eruptions from the land.

People and decomposing organics can start fires.

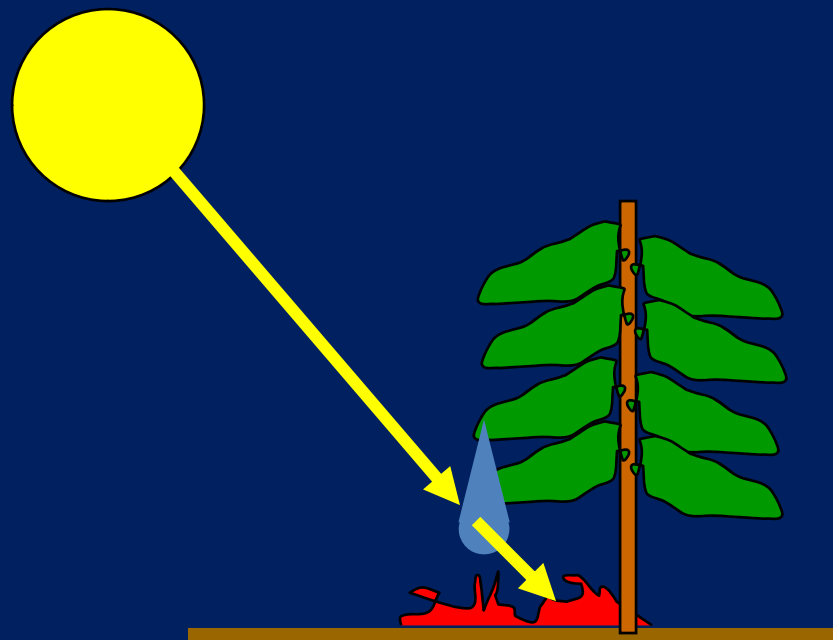
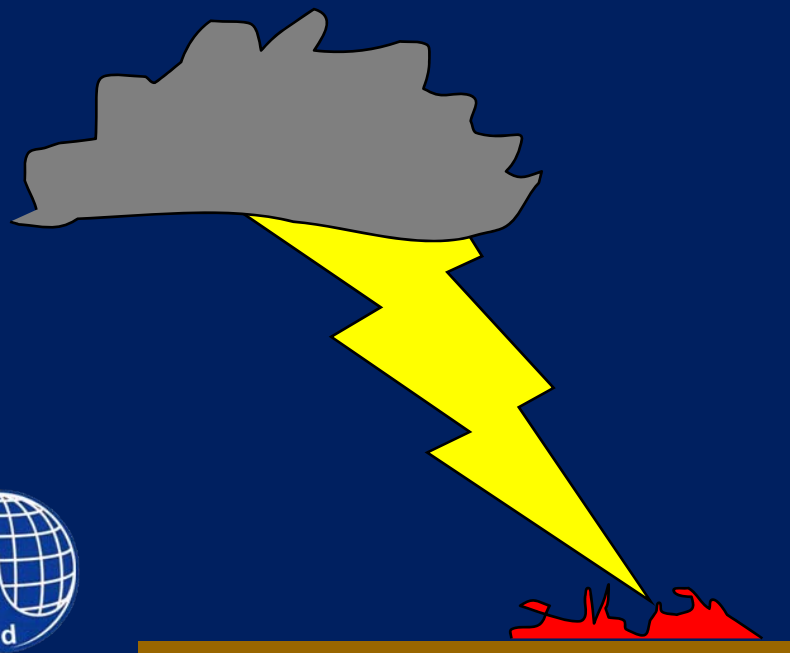




Heat from the Atmosphere



Lightning or sunlight from the sky.



Water drops can act like a lens to focus the sun's rays to start a fire





Lightning can start a wildfire

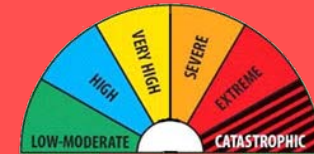
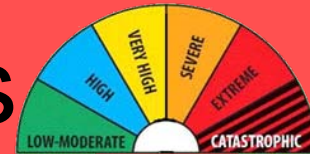


Photo from the Internet; educational fair use clause



Heat from volcanic eruptions



Lava flows reach
plants and set
them of fire.

Hot lava ash
and cinders
thrown up in
the air land
on plants
setting them
on fire.

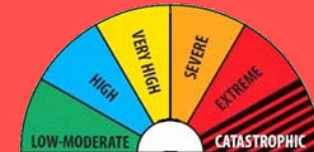


This is highly unlikely in Nan Province, Thailand.



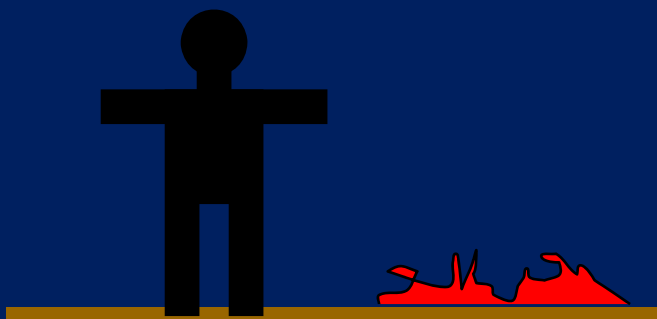


Living Things Start Fires



People can start fires.

Heat from decaying
plant materials can
start a fire.



People are the main cause of
wildfires in Nan Province.

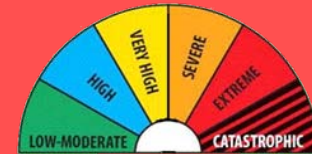


Compost pile



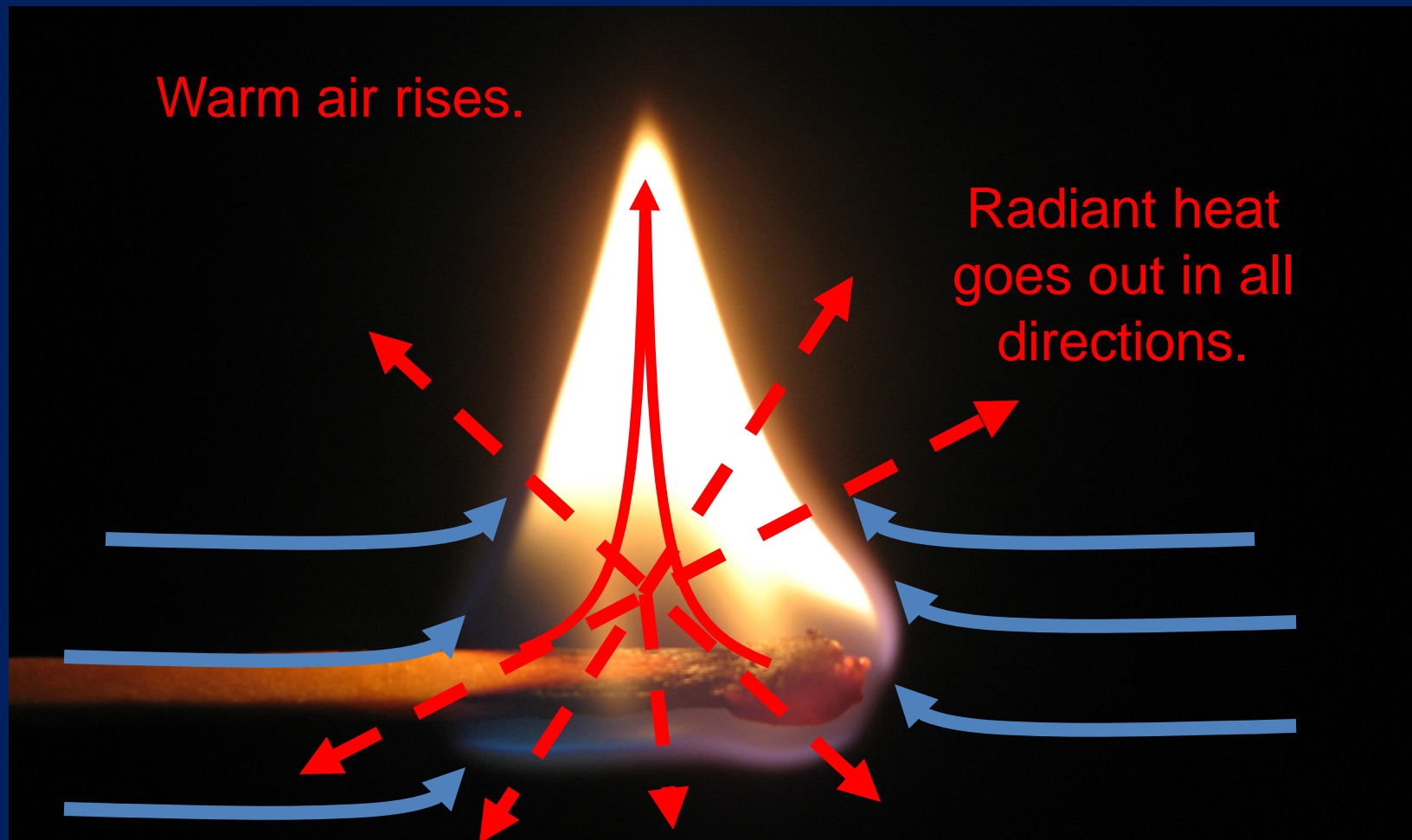


Fire Behavior



Warm air rises.

Radiant heat goes out in all directions.

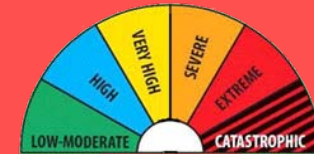


Cooler air flows into the fire.





Fire and Fuels



Fuel texture and moisture content of the fuel materials affect wildfires.



Fuel Moisture: The heat of the dry season removes water from plants. As plants dry out, they are easier to burn.

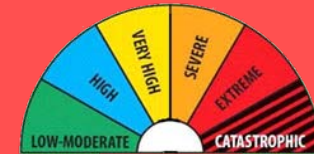
Fuel Texture: The size and type of plants affect fire. Smaller, finer texture plants (grass) are easier to burn than larger, coarser plants (trees).

Fuel for Fire: Dry, dead plants are the common fuel for wildfires.





Fire and Fuels

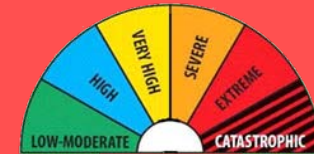


The heat of the dry season removes water from plants.
As plants dry out, they are easier to burn.





Fire and Fuels

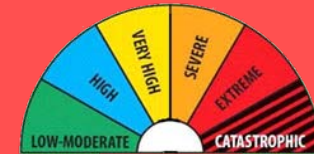


The size and type of plants affect fire. Smaller, finer texture plants (grass) are easier to burn than larger, coarser plants (trees).





Fire Fuels

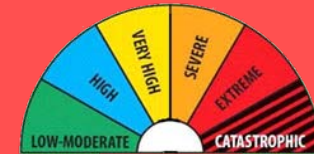


Dry, dead plants are the common fuel for wildfires.





Land and Fire

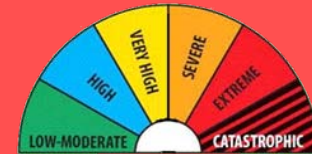


Land covered with dry vegetation will burn easier than land with green vegetation or land with no vegetation.





Land and Fire



The surface cover of the land and the slope of the land affects fires.



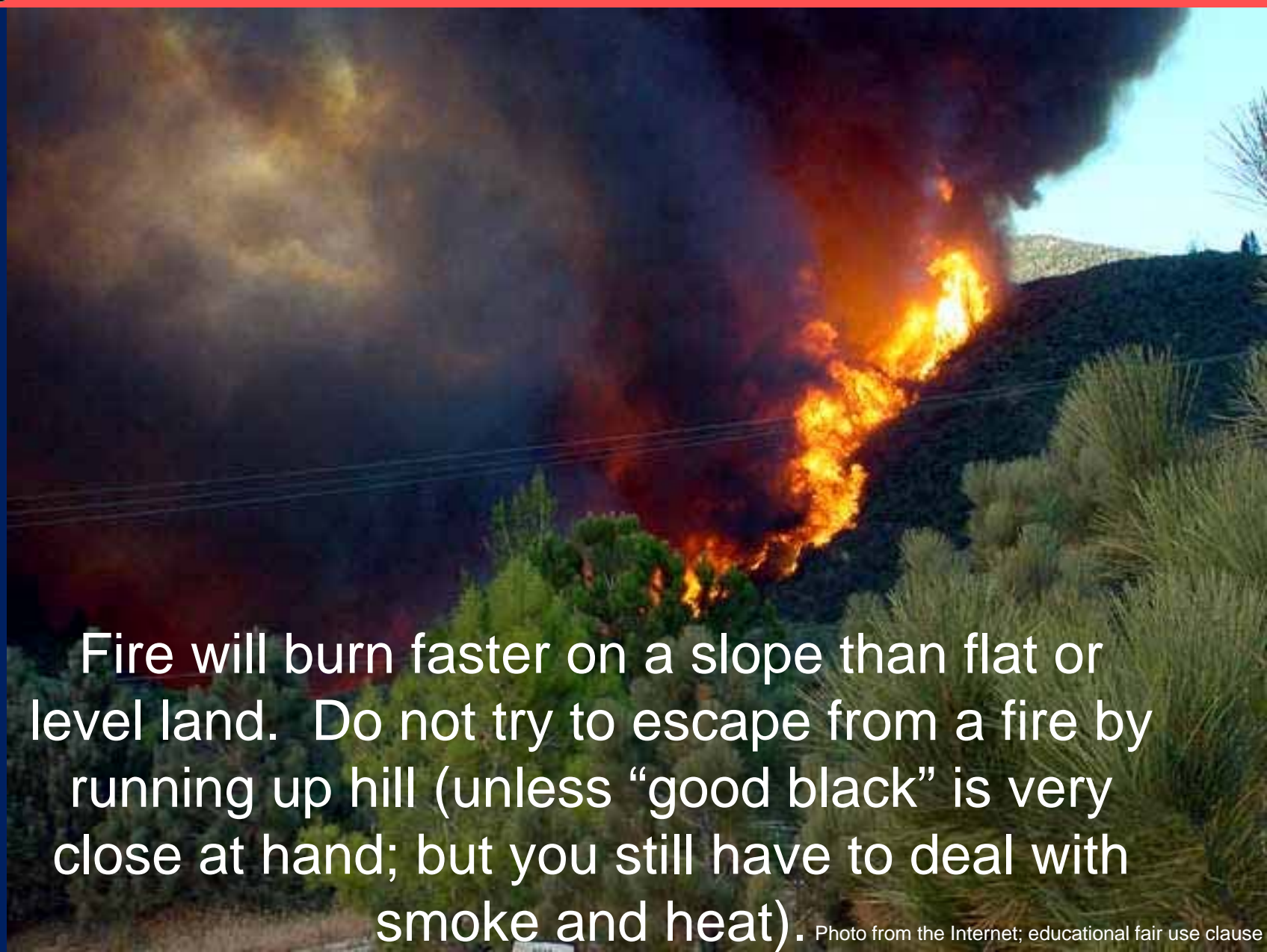
Surface Cover: Land covered with dry vegetation will burn easier than land with green vegetation or land with no vegetation or bare soil.

Surface Slope: Fire will spread faster on sloping land than flat or level land.





Surface Cover and Fire

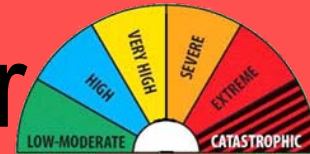


Fire will burn faster on a slope than flat or level land. Do not try to escape from a fire by running up hill (unless “good black” is very close at hand; but you still have to deal with smoke and heat).





Slope and Fire Behavior

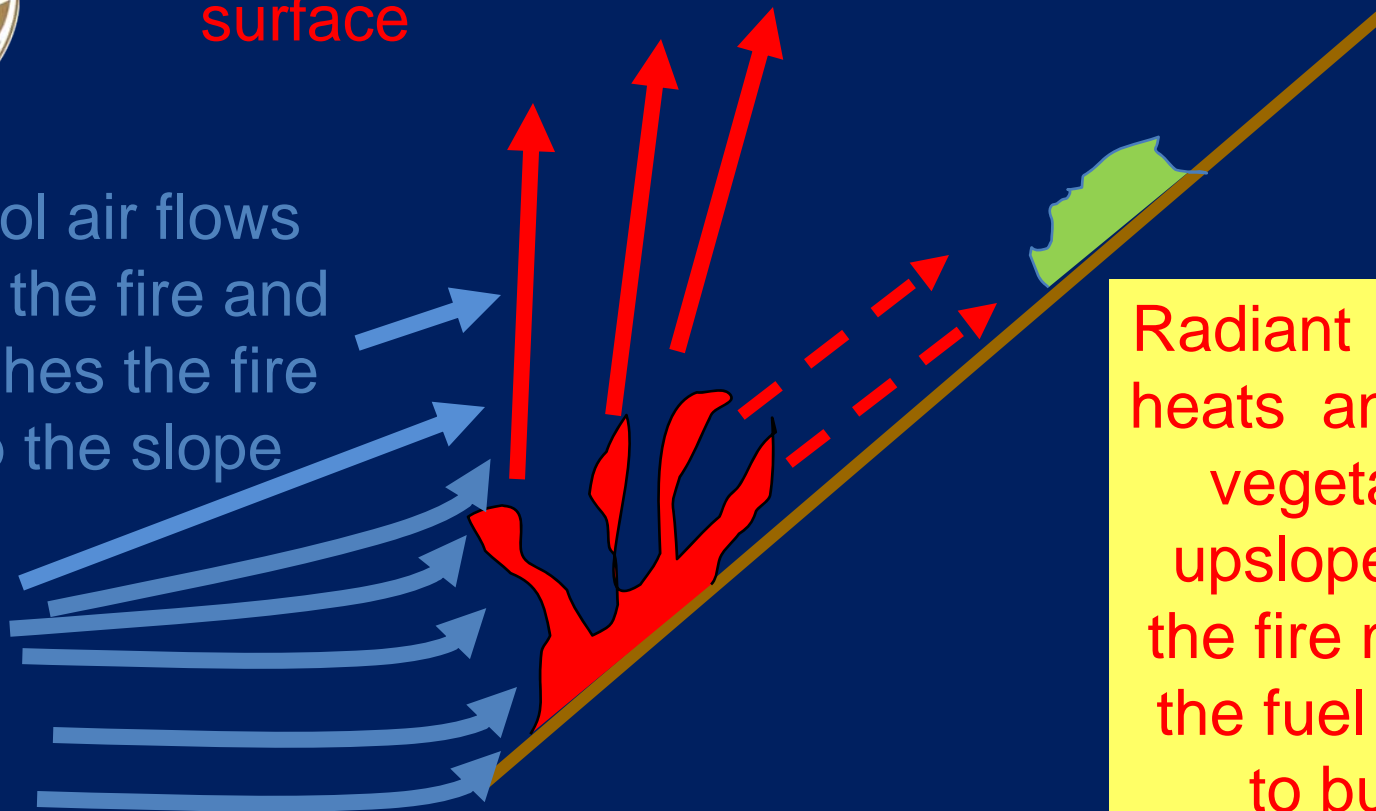


Fire will spread faster on sloping land because...



Warm air rises creating
lower pressure near the
surface

Cool air flows
into the fire and
pushes the fire
up the slope



Radiant energy
heats and dries
vegetation
upslope from
the fire making
the fuel easier
to burn.

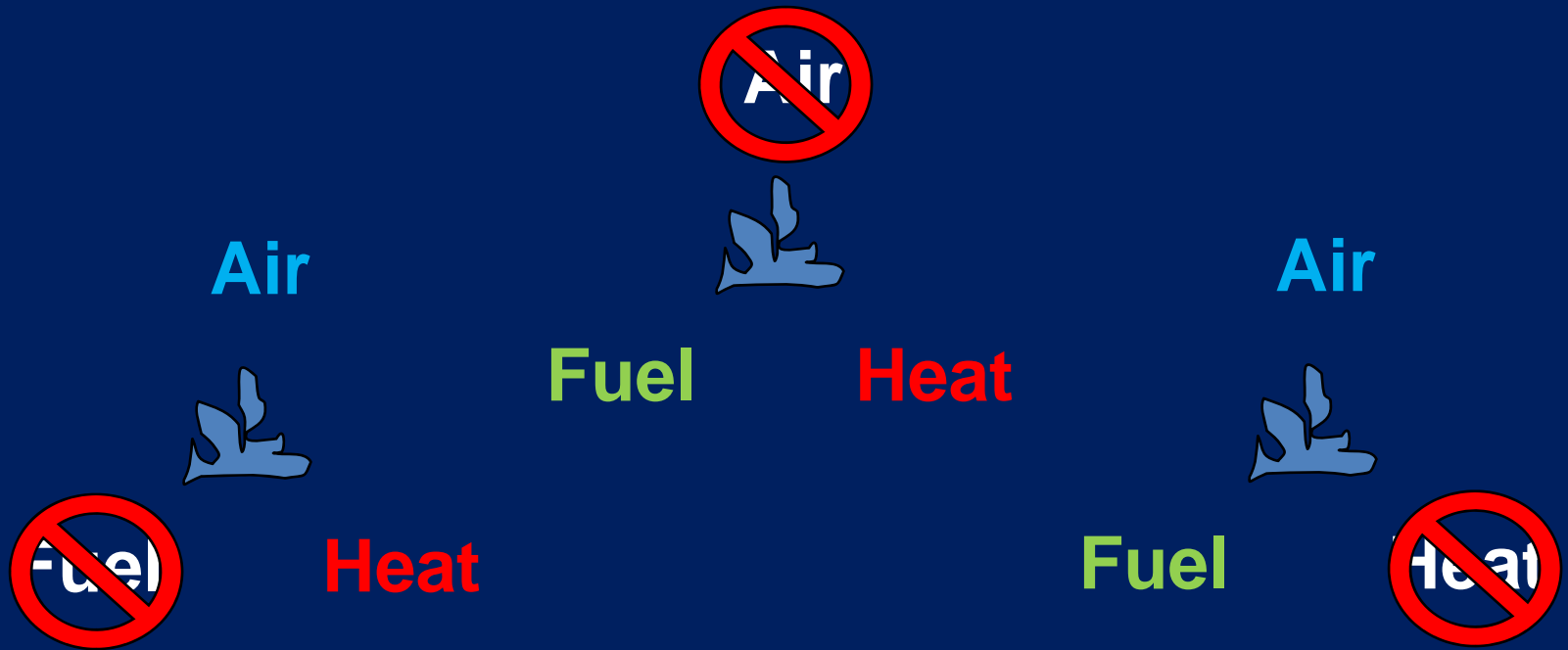


Fire intensity is hottest upslope.



Basic Fire Fighting

Fire needs air, fuel and heat to live. Remove any one or more of these and the fire dies.



Common Fire Fighting Hand Tools



Photo from the Internet; educational fair use clause

Removing Air



Fire needs air to live. If you remove air from the fire, you can stop the fire.

Fuel

Heat

Covering the fire with dirt will cut off the air fire's air supply.

- You need hand tools to scrap away vegetation to get to bare mineral soil.
- You need hand tools to scoop up the bare mineral soil to throw at the base of the fire to cover it.



Removing Fuel

Fire needs fuel to live.
There are a number of
ways to remove fuel
from a fire.

Air



Heat

- Cut and clear vegetation (making a fire break).
- Burning vegetation ahead of the fire (back fire; using fire to fight fire).
- Selectively planting vegetation that is less likely to dry out.



Removing Heat

Air



Fuel



Fire needs heat to exist.
Removing or reducing
heat helps stop a fire.

- Pour water on the fire to put it out or reduce the heat so new fuel will not burn.
- Increase fire fighting efforts when air temperature is lowest and relative humidity is highest (early morning or late night).
- Rain and fog help to lower temperatures.



Prevention and Avoidance

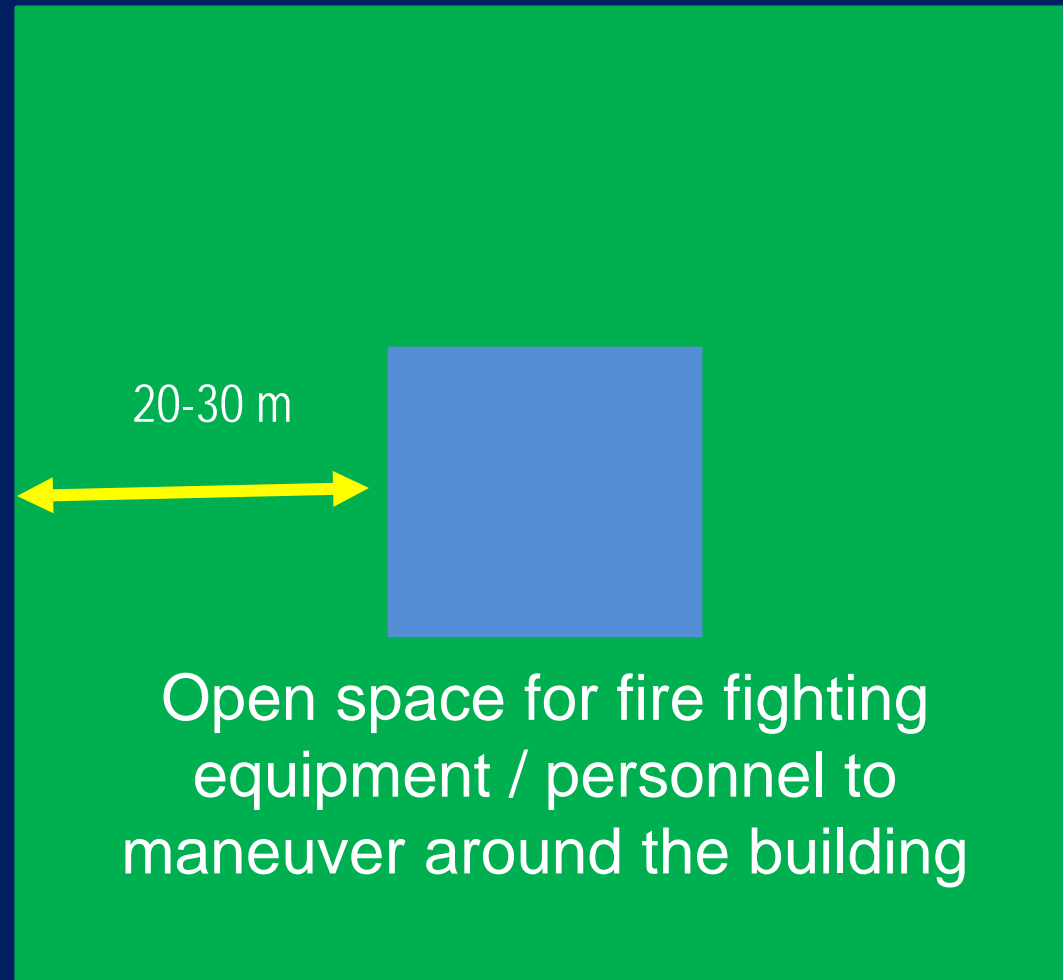
It is easier to prevent wildfires or avoid the conditions favorable to wildfires than to fight them

- Reduce available fire fuels
- Remove potential fire fuels from near your home
- Don't build in areas easily threatened by wildfires
- Use terrain to your advantage



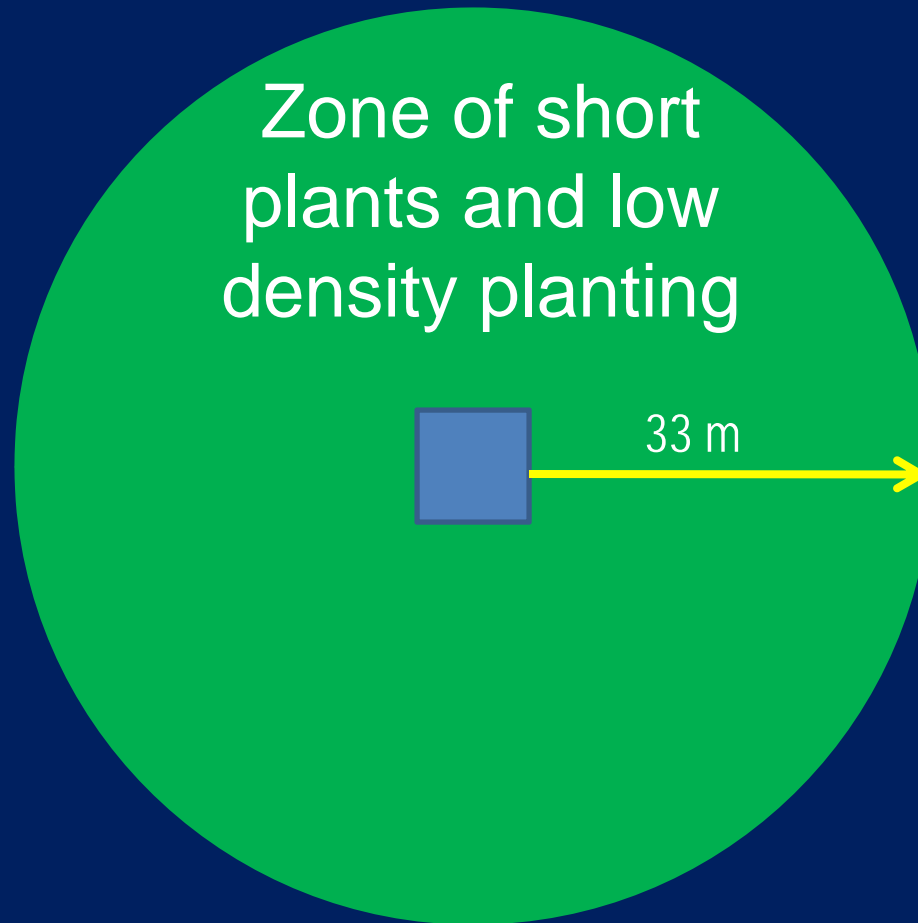
Plan for Fire Fighting

Have defensible space around the building



Remove potential fire fuels around your home

Keep vegetation around the building low (height and density) and of fine texture



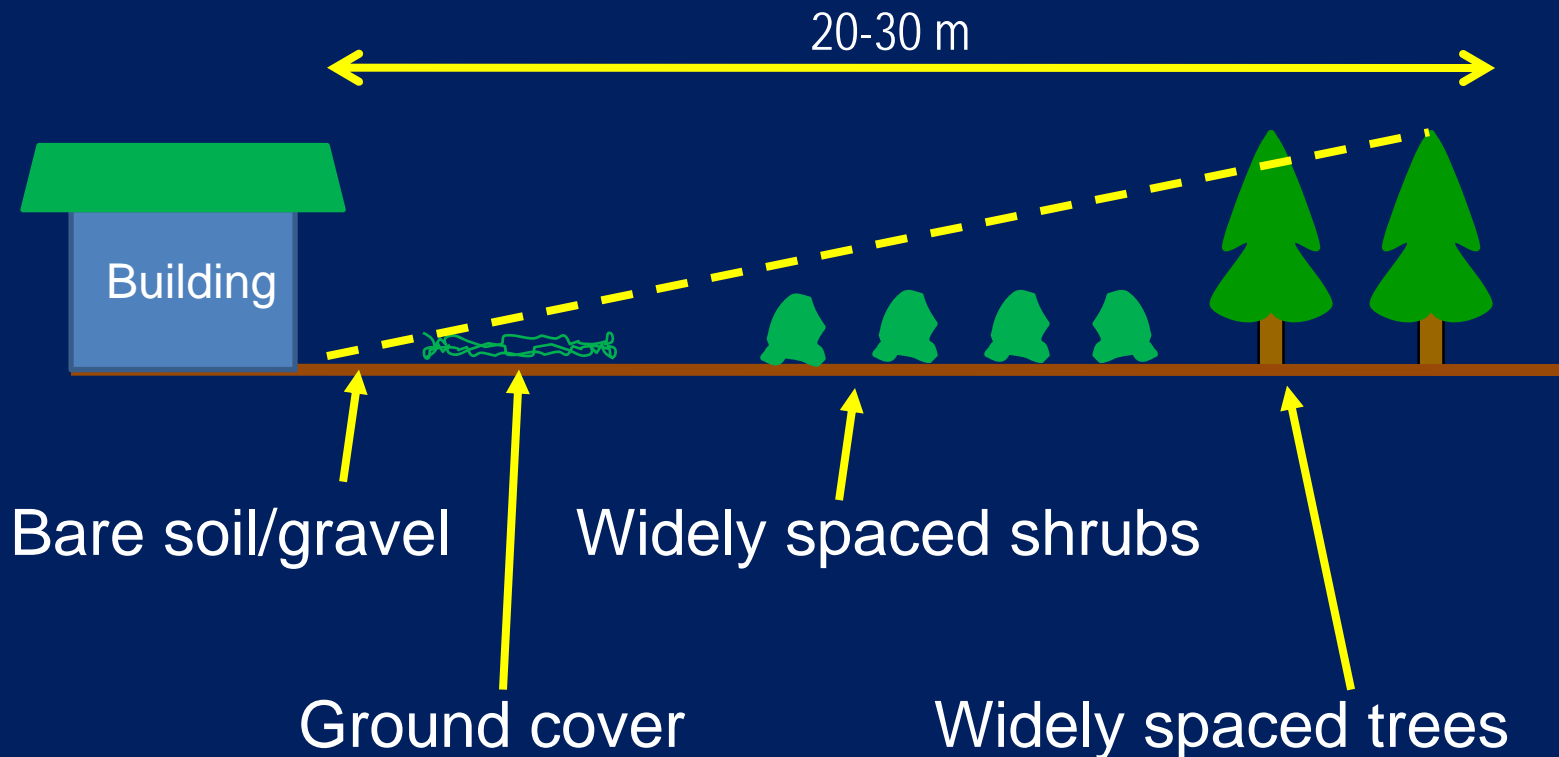
Grass burns quickly creating “good black” (a zone of no fuel) to protect your home.



Plan for Fire Fighting

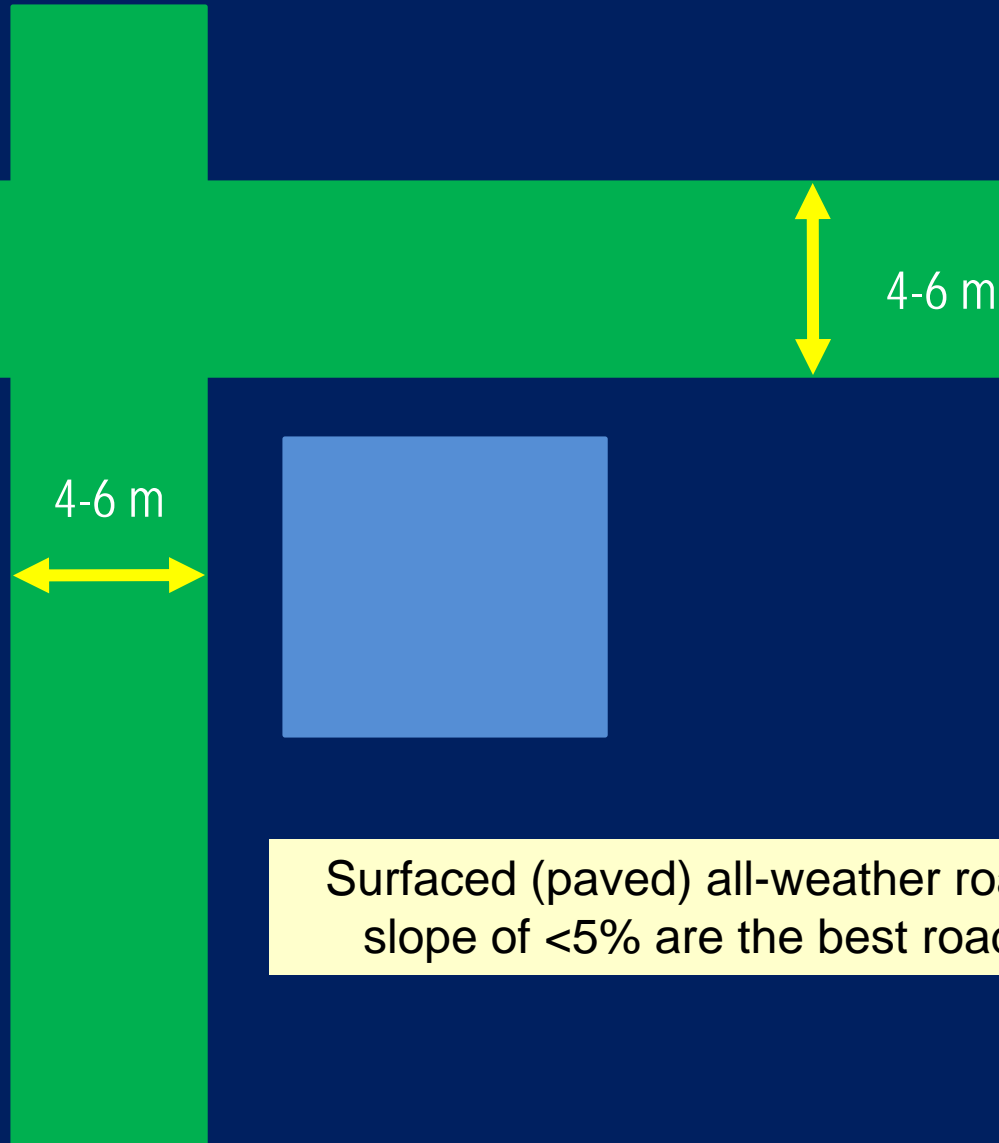
Use a zoned defense strategy

Bare soil next to building; increasing height with increasing distance from the building



Plan for Fire Fighting

More than 1 access road at least 4-6 m wide



Surfaced (paved) all-weather roads with slope of $<5\%$ are the best road type.

Plan for Fire Fighting

Easy access to water for fire fighting

Consider a fire
sprinkler system for
the house

Fish pond

House

Keep fire fighting tools / equipment on hand
(e.g. water pump, hoses, etc.)



Build with Fire Resistant Materials

- Use fireproof roofing materials
- Avoid extensive exposed exterior wood
- Avoid large picture windows facing toward the direction of possible fires
- Avoid open deck and features allowing wind/flames to enter from below.



Don't build in areas easily threatened by wildfires

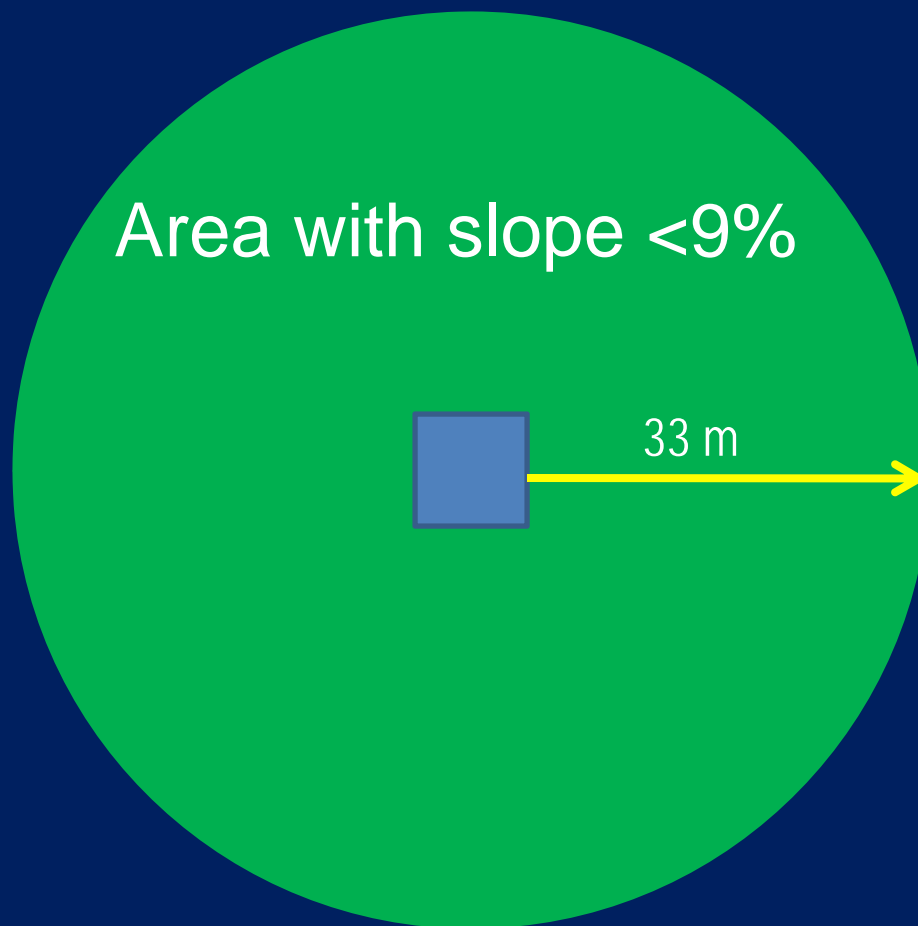
- Avoid sites where the building is surrounded by trees
- Avoid sites in area of known wildfires or repeated wildfires
- Avoid sites with only 1 access road



Photo from the Internet; educational fair use clause

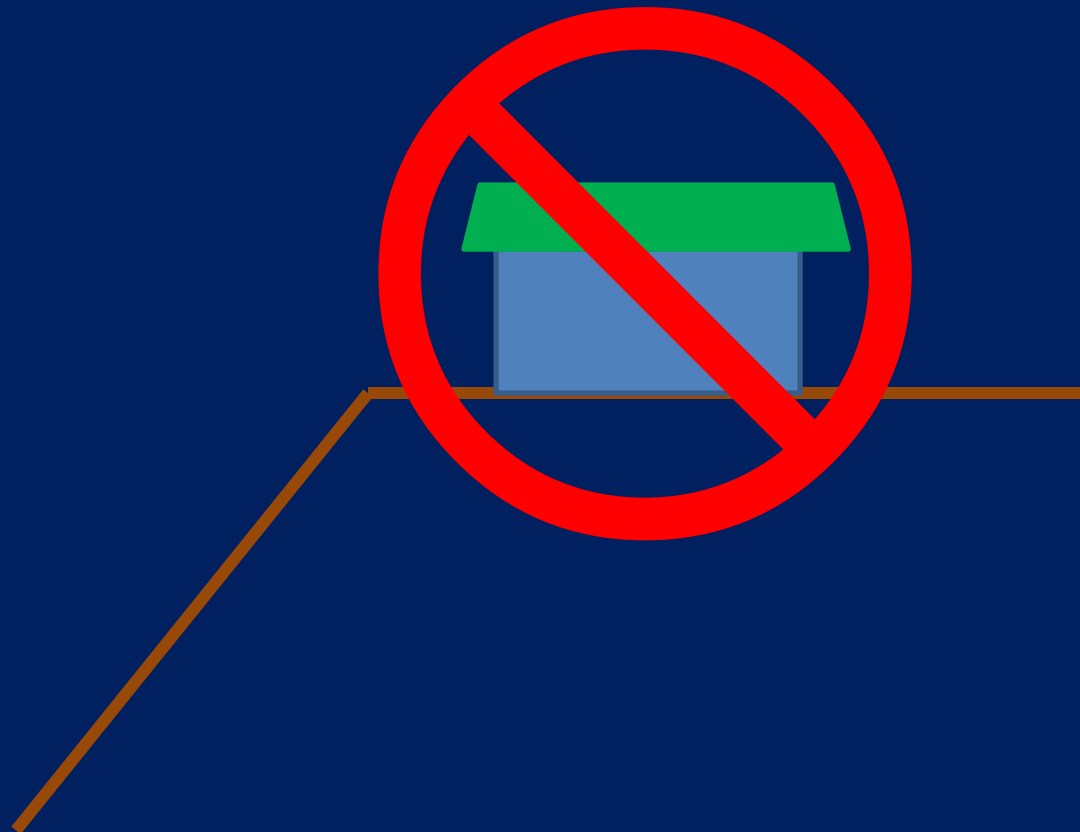
Use terrain to your advantage

Build on land with a slope less than 9%
within 100m of building



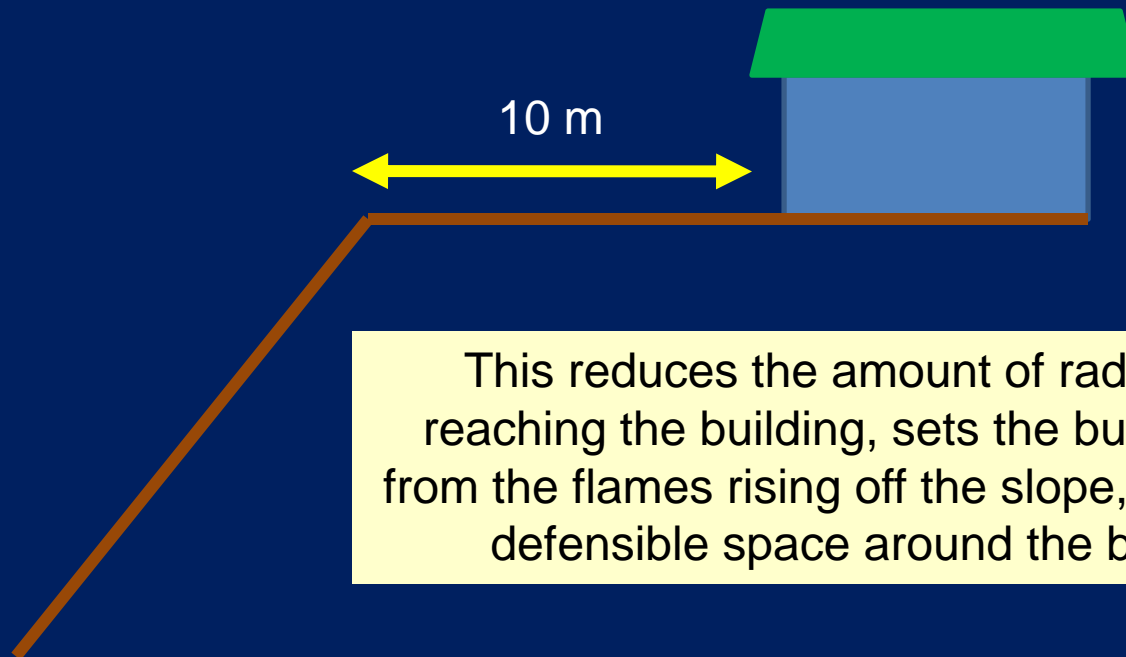
Use terrain to your advantage

Avoid building sites upslope from potential wildfire area



Use terrain to your advantage

If slope is 30% or more, keep building back 10 m from the edge



This reduces the amount of radiant heat reaching the building, sets the building back from the flames rising off the slope, and creates defensible space around the building.



Smoke may be the first sign of a fire.

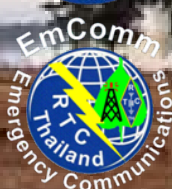


Smoke from wildfires tends to be reddish-brown when sunlight shines through it.

Smoke is small unburned solid particles carried into the sky by the hot air rising from the fire.



“Where there is smoke, there is fire” is a common English saying.



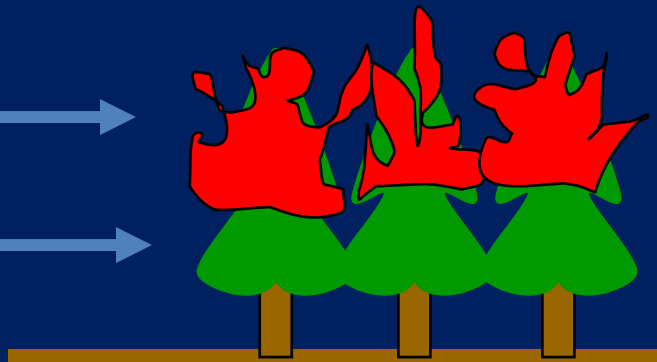
Three Basic Types of Wildfire



Creeping: Low temperature, slow speed.



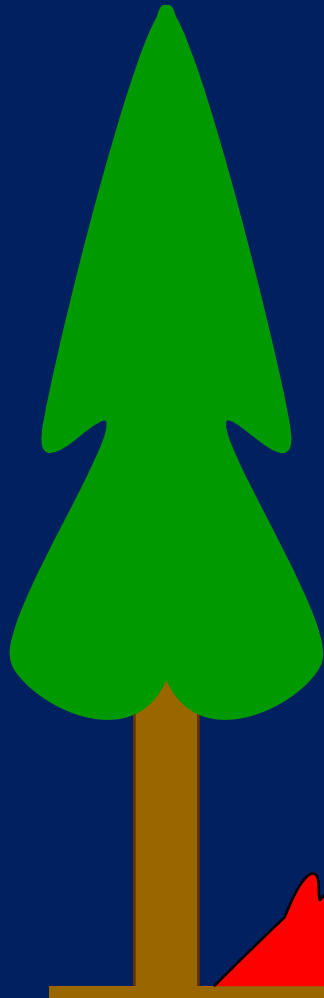
Jumping: Moderate temperature, moderate to fast speed depending on the wind conditions.



Crown Fires: High temperatures, high speed, depending on wind conditions.



Creeping or Crawling Wildfire



This type of wildfire has a slow speed, low temperatures, and usually does not burn more than 2 meters above the ground. Creeping fires usually do not burn trees.

This is the most common type of wildfire in Nan Province.



Photo from the Internet; educational fair use clause





Leaf litter is the fuel for creeping fires.



The speed of
the fire
depends on
the terrain,
amount and
type of fuel,
and the wind
velocity.



Photo from the Internet; educational fair use clause

Factors Affecting the speed of Creeping Fires

	Factors	Slow Burning	Fast Burning
Fuel	Type	Coarse (branches)	Fine (grasses)
	Amount	Little	Much
	Moisture	Wet (green)	Dry (brown)
Terrain	Flat	X	
	Gentle Slope	Moderate	
	Steep Slope		X
Wind	None; calm	X	
	Moderate	Moderate	
	Strong		X

Weather / wind conditions can change with short notice. Pay attention and consider what those changes can mean to your safety when fighting wildfires.

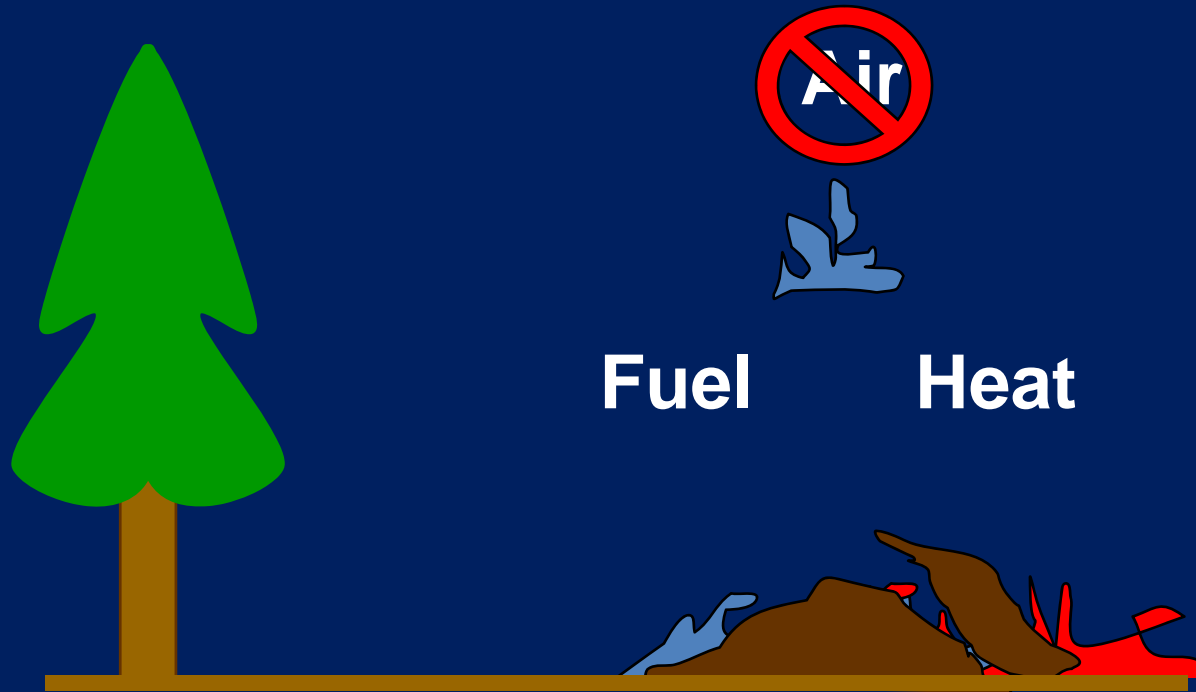


Forest fire fighting truck with a creeping fire.



Fighting a Creeping Wildfire

Remove Air: Smother the fire with mineral soil.



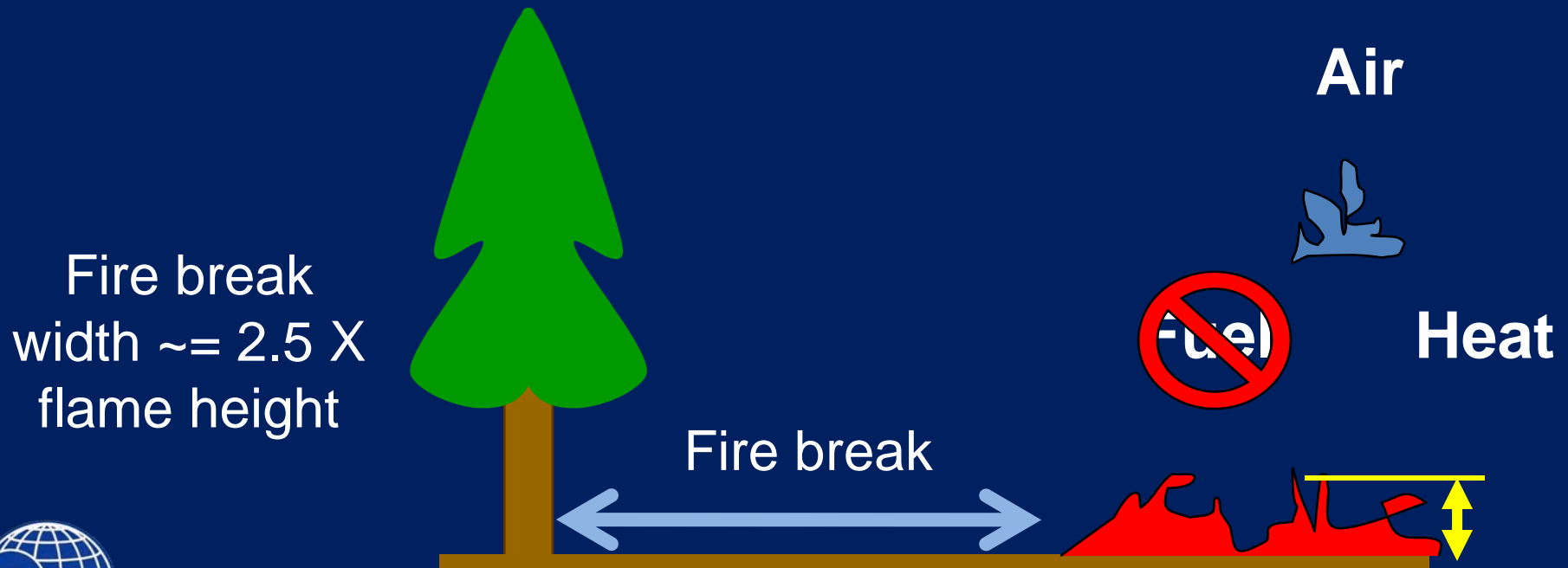
Use a shovel to scoop bare mineral soil.

Throw it at the base of the fire.



Fighting a Creeping Wildfire

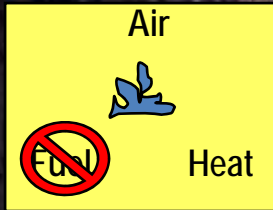
Remove Fuel both before and during the fire.



Before fire season, clear brush and dead vegetation that can burn from around trees and structures. These clear areas are called fire breaks.



Clearing away fuel before a fire.



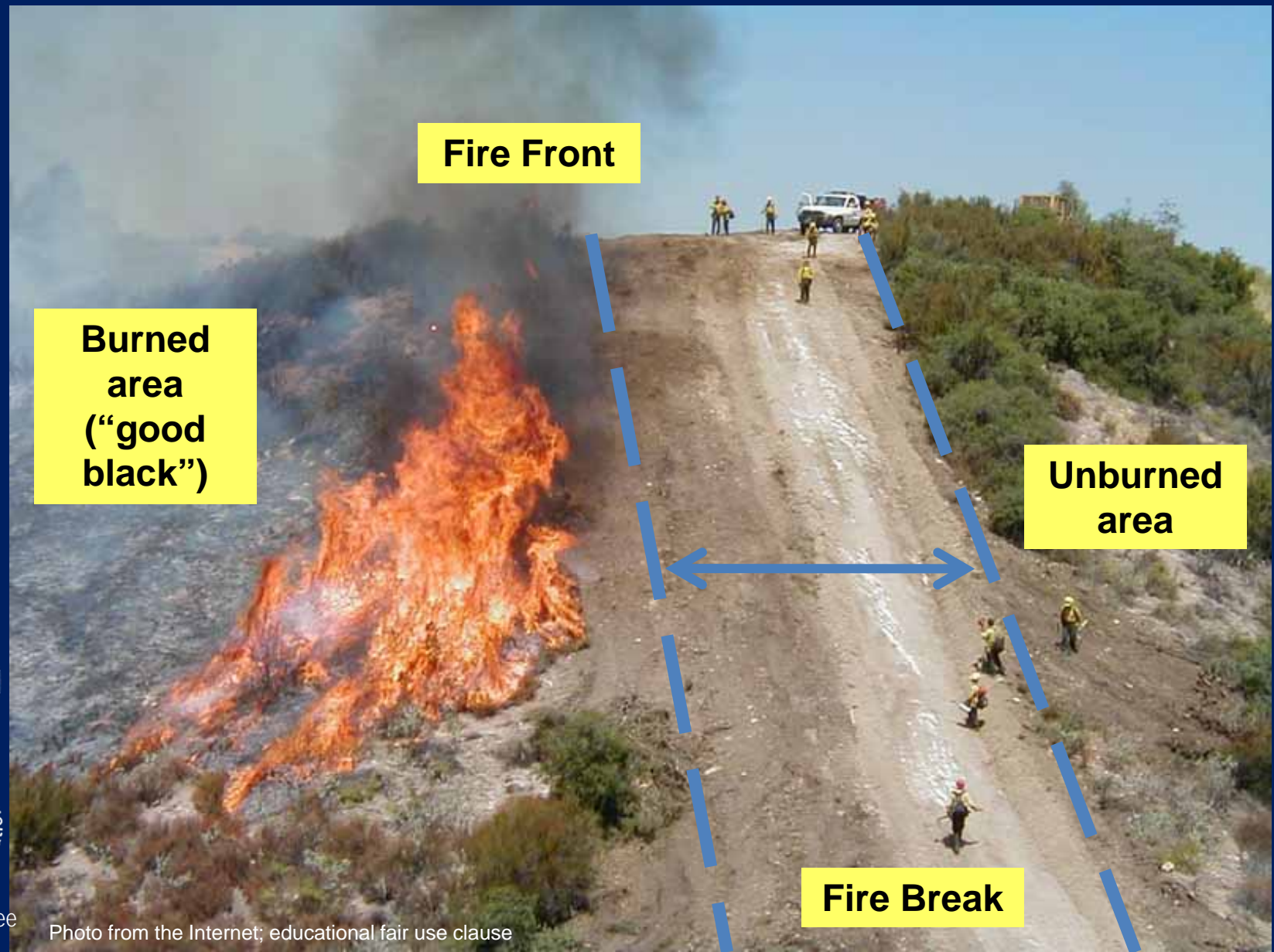


Remove Fire Fuel

Fire crews clearing fuel by scraping down to bare mineral soil to create a fire break.



A dirt road used as a fire break.



Fighting a Creeping Wildfire

Remove Heat: If enough water is available spray water at the base of the fire.

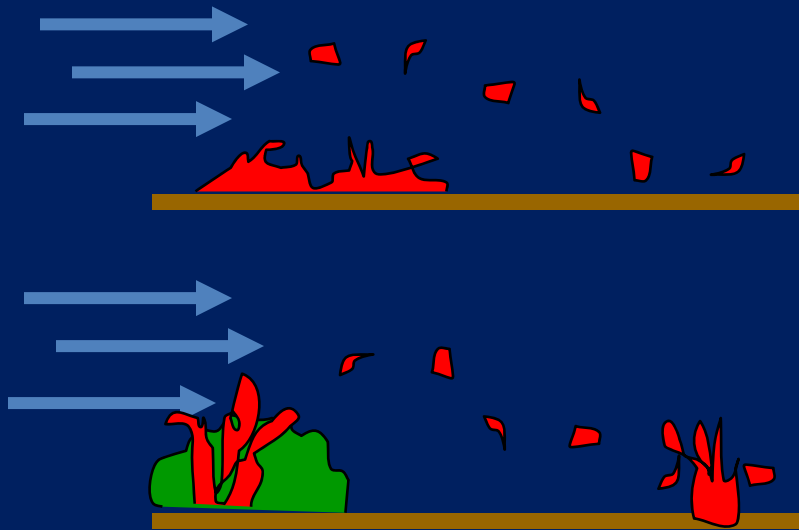


In many cases, water may not be readily available to fight wildfires in Thailand.



Wind can make creeping fires into jumping fires.

Moderate to high temperatures, moderate to fast speed depending on the wind conditions.



Wind blown hot ash and glowing embers can land in areas of unburned fuel starting new spot fires.



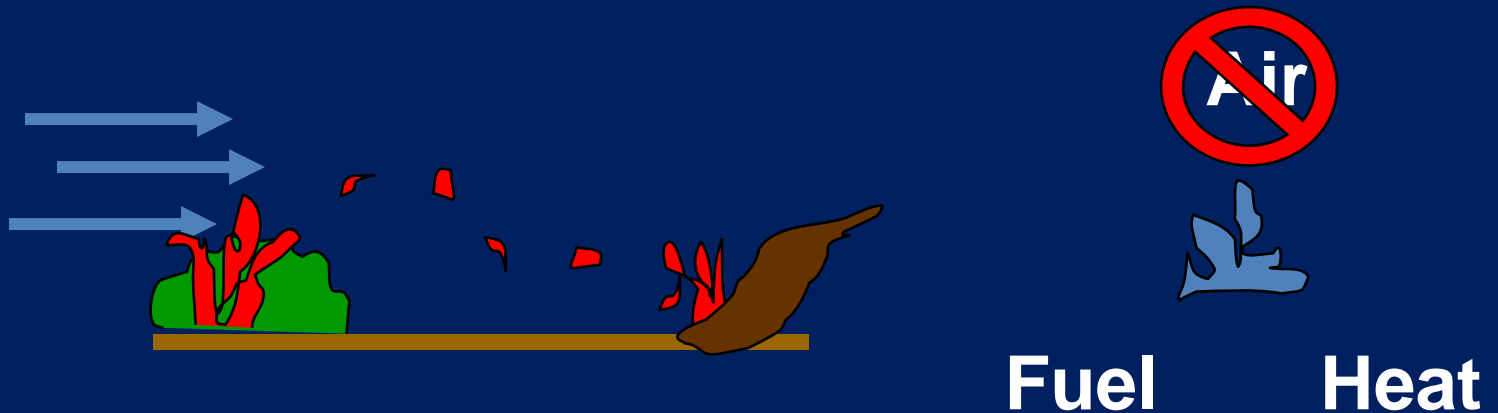
- Grasses and shrubs are common fuels for jumping fires from creeping fires.
- Watch wind speed and direction and be aware of changes in wind conditions.

Numerous Spot Fires



Fighting Jumping or Spot Fires

Reduce Air: Use a shovel to scoop bare mineral soil. Throw it at the base of the fire.

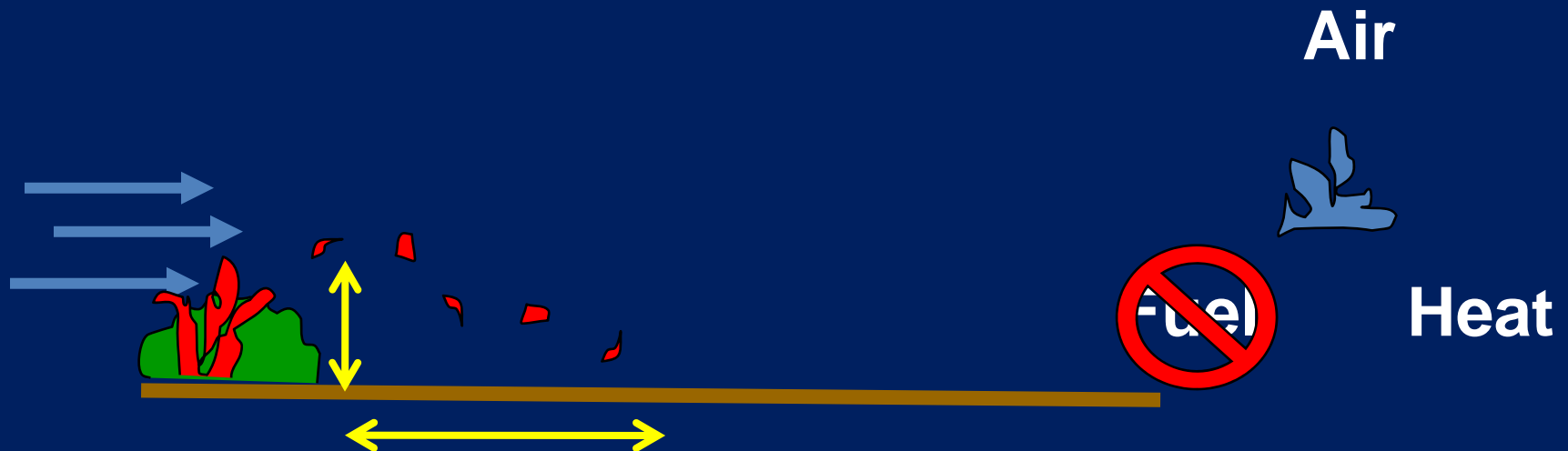


It is a race to put out the new “spot fires” before they become bigger fires. But you must always be aware of where you are relative to your SAFE AREA.



Fighting Jumping or Spot Fires

Remove Fuel: Prepare and maintain fire breaks before the fire season.



The width of the fire break should be about 2 ½ the height of the fire. This is not always easy to know; wind conditions can change and make the fire bigger. Keep a close eye on the weather conditions!





Fuel

Heat

Air



Heat



Fire crews shoveling soil and clearing fuel to fight spot fires.

Fighting Jumping or Spot Fires

Remove Heat: If enough water is available spray water at the base of the spot fire.

Air



Fuel

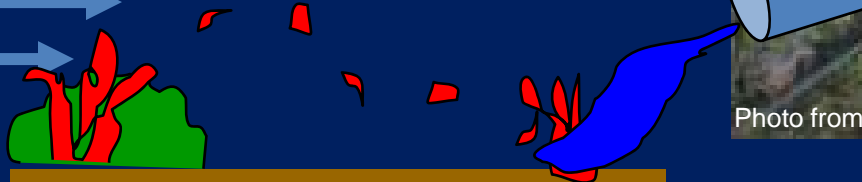


Photo from the Internet; educational fair use clause

Combine this with established fire breaks for optimum fighting of jumping fires.



Creeping fires can develop into crown fires.



Remove “ladder” fuels

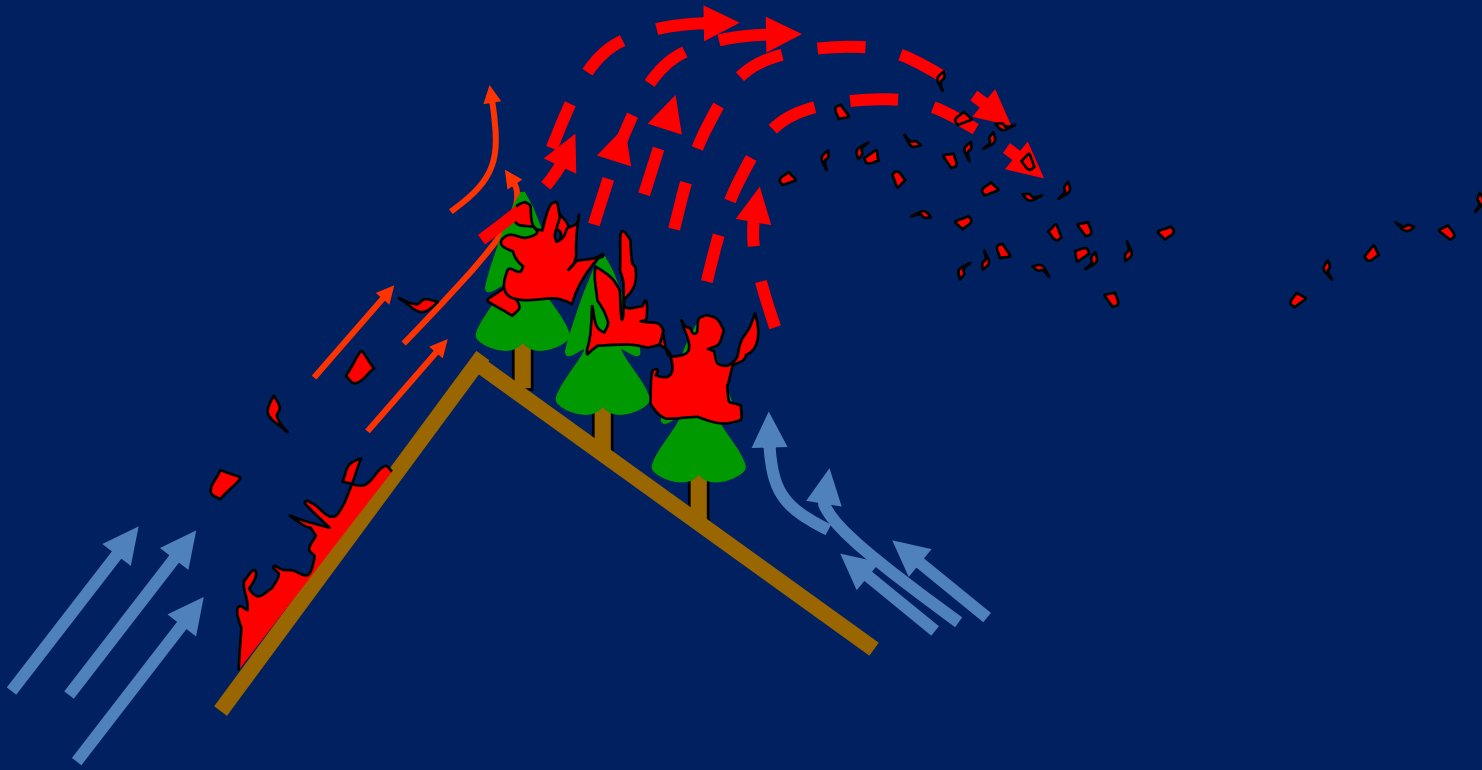
Remove vegetation climbing on or near trees.



Vines are common ladder fuels in Thailand.



Jumping fires can cause crown fires

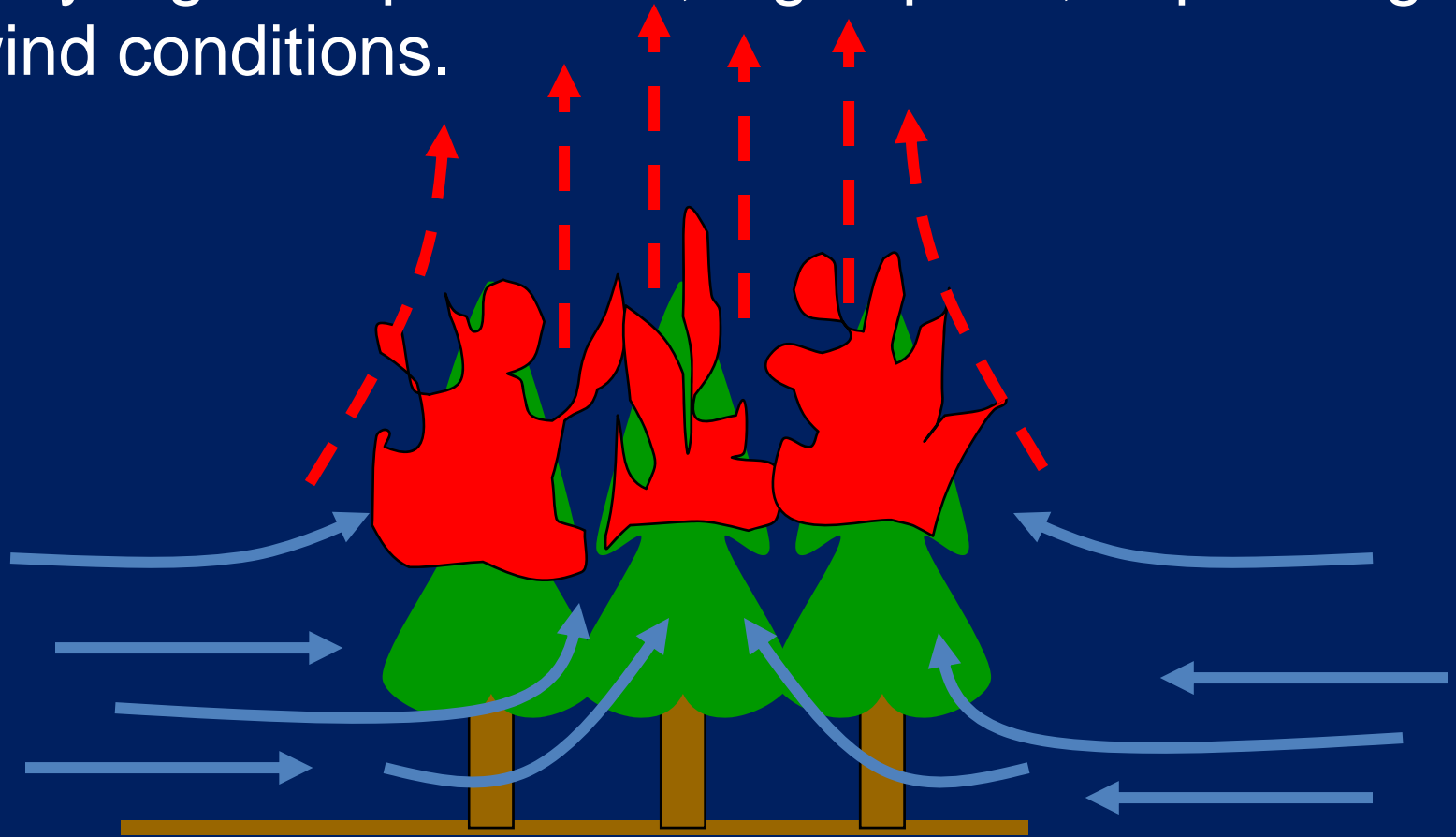


Wind and terrain can take embers from jumping / spot fires and carry them to unburned fuel in tree crowns to make crown fires.



Crown or Canopy Fires

Very high temperatures, high speed, depending on wind conditions.



Strong updrafts create winds coming to the fire and draws oxygen away from the ground level.



Crown fires are very intense fires that are hard to control.

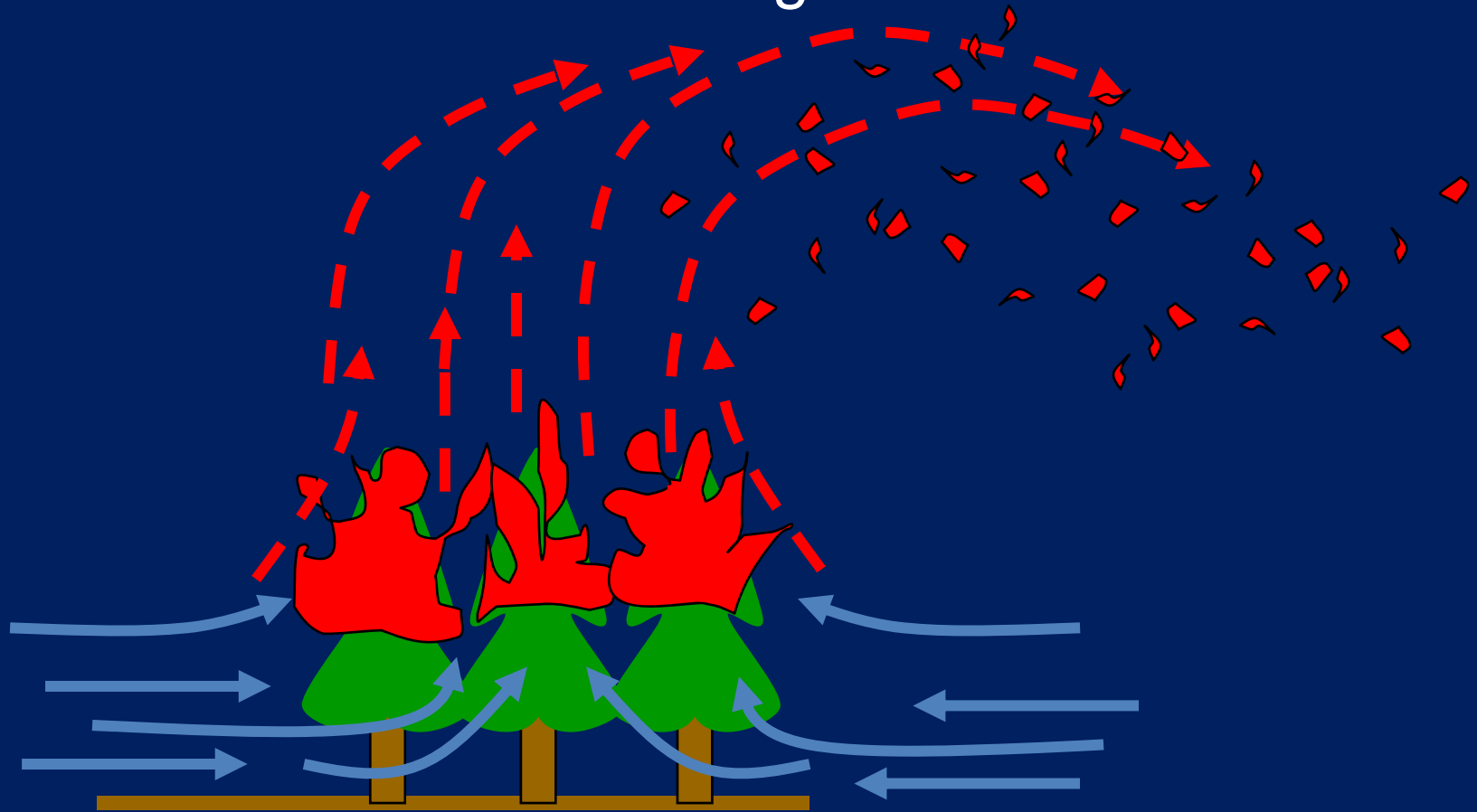


Crown fires can lift burning embers high into the air.



Crown Fires

Embers can be carried a long distance from the fire.



Temperatures get so hot the liquids in the trees vaporize. Volatile gases explode tossing embers higher and higher.



Wind carries burning embers to start smaller spot fires.



Ember factors
affect lofting
height

Ember size
affects burnout
time

Tree factors
affect lofting
"intensity"

20 ft
wind

Factors Affecting Spotting



Managing Crown Fires

Crown (canopy) fires are too large and intense to put out. The typical strategy is to let them burn out.



Creating fire breaks to limit the spread of the fire is the key way to reduce fuel. However, in Nan, equipment may not be available or the terrain too mountainous.



After the Wildfire

Wildfires destroy the vegetation cover exposing the bare soil to the coming rainy season. This can result in increased danger of landslides.



Landslides

Photo from the Internet, educational use clause

© 2010, G.K. Lee

Created by G.K. Lee for the RTC-TH EmComm

EP-8



Review Lesson EP-8 to learn more about landslides.

Remember: You are responsible for your safety and survival in a disaster.



Take action today:

- Make an Emergency Plan
- Prepare your Emergency Kits
- Encourage others to prepare



Once a disaster strikes, it is too late to try to prepare!



The next lesson in the Emergency Preparedness Series is EP-11



© 2010, G.K. Lee

Created by G.K. Lee for the RTC-TH EmComm

EP-11

Rural Training Center-Thailand RTC-TH

is dedicated to
providing
community-based
environmental
education for the self-sufficiency
and sustainability of small rural
family farms



Free Self-Study Materials by Internet

Use of RTC-TH copyrighted materials are available for private / non-commercial educational use without written permission if no changes are made, no fee is charged, and proper attribution is made to the RTC-TH.

Commercial use of the materials is prohibited without written permission.

These materials are in English. Volunteer assistance for translation to Thai is welcomed and will be acknowledged and cited.



Questions or Comments

We are
always trying
to improve
our lessons.
Your
comments
and
suggestions
are
welcomed.



You may contact us by e-mail:
rtc2k5@gmail.com



For Emergency Preparedness Training



Contact
Greg, HSØZHM
Lesson Author / Mentor



Via E-mail / video chat
hsØzhm@gmail.com



Via Skype video
conference call: [rtc_th](https://rtc_th.skype.com/join)

Future RTC-TH Emergency Preparedness Lessons

- Identifying local Geo-Hazards
- Finding safe evacuation / shelter sites
- Identifying main supply routes and alternate routes
- Finding Helicopter Landing Zones
- Helicopter landing zone hand signals
- Ground to air communication without radios



Community-based Environmental Education for



The End

www.neighborhoodlink.com/org/rtcth

E-mail: rtc2k5@gmail.com

