



Forest fires & Climate Change: a burning issue!

Causes and consequences of Climate Change

Type of pedagogical project, activity, action, accompanying	Project on Forest fires & Climate Change
Key words of relevant disciplines/ Pedagogical content	Biology, Sciences, Geography, civic education/ Wildfires, Forest fires, Climate Change, Mediterranean Ecosystems, Fire Ecology, fire triangle, Natural Disasters
Problematic	How does Climate Change affect the occurrence of wildfires in the Mediterranean countries? Should we attribute every forest fire to climate change?
Thematic	Mediterranean ecosystems, Vegetation adaptations, Wildfires, Natural Disasters, Biodiversity
Disciplines (sciences, geography)	<i>Biology, Sciences, Geography, civic education</i>
Pedagogical Objectives/New targeted skills	The students will be able to: <ul style="list-style-type: none"> - Work in a team - Explore the concept of wildfires and be able to categorize/ distinguish: required necessary conditions, causes, effects, response, post-fire management measures, prevention measures (step 1). - Empathize with people involved in major wildfire incidents (step 2a). - Be able to distinguish the required necessary conditions (fire triangle) from the causes (anthropogenic & natural) of wildfires (steps 2b & 2c)





	<ul style="list-style-type: none"> - Be able to identify the main characteristics of the Mediterranean climate and the main types of vegetation (phrygana, maquis, forests) (step 3). - Understand that wildland fires are a natural phenomenon and the Mediterranean ecosystems have evolved mechanisms to regenerate after fire (step 4a). - Develop and enhance their knowledge and attitudes related to the restoration of the burned ecosystems (step 4b). - Investigate the causes of wildfires of recent decades and make comparisons and categorizations (step 5). - Enhance creativity & expression through body language and art (steps 5a & 5c). - Investigate the extent of forest fires in recent decades, especially under the influence of climate change (step 6). - Demonstrate the positive use of Fire Danger (Forecast) Map as early warning system for prevention (step 7). - Develop the capacity to present facts, knowledge and ideas to others. - Promote fire prevention and knowledge in the community (step 8). - Find, evaluate and process information from various sources.
Public target(s) (age, requested skills...)	11-15 years old
Description (step by step)	<p>Preliminary Step: Which Tribe do you belong to?</p> <p>Step 1) Explore the concept of Forest Fires Objective: Explore the concept of wildfires and be able to categorize/ distinguish: required necessary conditions, causes, effects, response, post-fire management measures, prevention measures The project begins with an extensive brainstorming on the concept of "Forest Fires". All students say words that come to their mind in the hearing of the</p>





concept. Then categorization of the words is proposed collectively by the whole class (including the teacher). A categorization scheme that may occur might include: weather conditions, causes, negative effects, response (to the incidence), post-fire management measures, prevention measures, biotic & non-biotic factors of the ecosystem, etc.

At a next stage, each group selects one of the categories (or two, so that all major categories are covered) and constructs a concept map which is then presented to the whole class.

Each concept map may be amended in the next steps when more knowledge on each subject/category is acquired. The final composite concept map will be presented to the public in the last step.

(2 periods)

Step 2a)

Sensitization to the subject of Wildland Fires and empathy

Objective: Empathize with people involved in major wildfire incidents

A short video (up to 5'-6') on a major case of wildland fire is projected in the class (e.g. <https://www.youtube.com/watch?v=ifhSTPubgZM>). The video could be from any Mediterranean country and is preferably in a different language in order for the students to get into the images more intensively.

An open discussion follows in order to reveal the experiences of students of such incidents, their feelings and their thoughts when they position themselves in the roles of people shown in the video (fire-fighters, people who lost their properties or were injured, people leaving the affected areas in agony, etc).

Step 2b)

What caused the fire? Was it the wind or the dry weather?

Objective: Be able to distinguish the required necessary conditions (fire triangle) from the causes (anthropogenic & natural) of wildfires

The following question is asked to the class:

Which factors do you think caused the fire in the video?

After the discussion and the explanations by the teacher, the students should understand that there are two different components in the answer:

a) **the necessary conditions** which are required for any fire to start and are represented by the fire triangle (O₂, fuel, heat). The following video could

assist the discussion: <https://www.youtube.com/watch?v=tx14SBh2e9c>

- and -





b) **the origin of the ignition** (the first sparkle) that actually caused the fire.

Step 2c)

Categorization of causes (natural & anthropogenic)

The students (in groups) are given small cards with images (or words) of different causes (e.g. lighting, volcanic eruption, camp-fires, barbeque fires, left cigarettes, candles, electricity wires, different kinds of machinery producing sparkles, bee smokers, burning of straws and branches, burning of trash, landfills, car exhausts, military exercises, warfare, fires set by shepherds, fires set by land owners, fires set to clear the forest and change its use etc.) and they are asked to divide them in 3 categories:

a) natural, b) by accidental/not intentional and c) on purpose/intentional. Then students discuss the role of humans in each category.

(1 period)

Step 3)

I live in a Mediterranean country. What does it mean in respect to nature (climate & ecosystems)?

Objective: Be able to identify the main characteristics of the Mediterranean climate and the main types of vegetation (phrygana, maquis, forests)

This step involves specialists' knowledge mainly regarding Mediterranean Ecosystems, the types of vegetation and the adaptations of plants to the harsh dry summer and to the occurrence of wildfires (see relevant knowledge sheet) that could be acquired through presentation either from the biology teacher, or from another specialized teacher/scientist (e.g. forester) that could be invited into the school. Alternatively, it could involve a visit to the Forestry Department or another related agency, Institute, or University.

The scientists involved and place of presentation could be discussed and decided upon with the students at the end of step 2.

(2 periods)

Step 4(a&b)

Burned but not dead: Resurrection from the ashes!

Objectives:

a) Understand that wildland fires are a natural phenomenon and the Mediterranean ecosystems have evolved mechanisms to regenerate after fire.

b) Develop and enhance their knowledge and attitudes related to the





restoration of the burned ecosystems

This step involves a field trip to a relatively recently burned area, or ideally in a site where patches of the forest have been burned in different years, generating a mosaic landscape. Also, it would be good if in the selected site different kinds of post-fire management measurement have been conducted.

The field work should be well organized and assisted by work-sheets on which the students, in groups, will note their observations and comparisons. The co-operation with an Environmental Education Centre or specialized scientists and nature-guides would be an asset.

(4-6 periods)

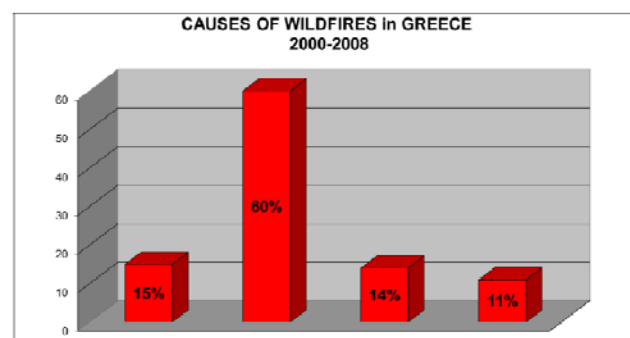
Step 5 (a, b & c)

Who sets the fire? We are all arsonists!

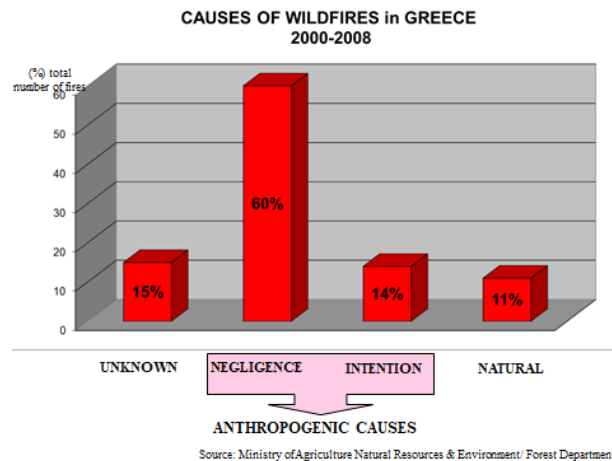
Objectives a, b & c: Investigate the causes of wildfires of recent decades and make comparisons and categorizations. Enhance creativity & expression through body language and art (a & c)

a) We organize a **short game** between two teams A & B (each team is composed of 2-3 students from each group), which involves role playing. **A team** are the arsonists by accident (**negligence**) and **B team** are the arsonists on purpose (**intention**). Each member of the team mimics one of the ways through which someone can cause a fire (see activity of step 2c) excluding natural causes. The other team try to guess what was the cause.

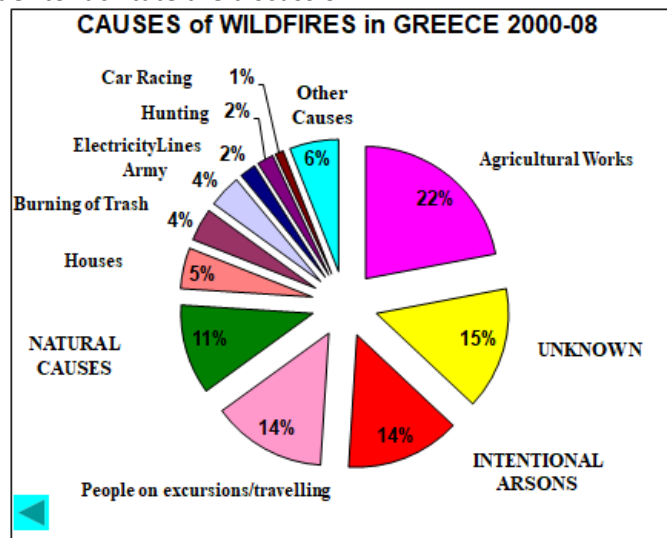
b) At the end of the game we give the following chart regarding no. of wildfires between 2000 and 2008 in Greece (official Data from the Greek Ministry of Agriculture Natural Resources & Environment/ Forest Department) and we ask the 4-5 groups to guess which of the **3 columns/percentages on the right** corresponds to: **a) Natural causes, b) Negligence** and **3) Intention** (the 1st column are the unknown causes).



When all groups have given their answers, we give them the solution:



Alternatively, the teacher can find data of its own country for the activity. A discussion follows, in order to reveal that we usually are the arsonists (even though not intentionally) and not any other weird or bad people! The breakdown of the 60% (arsons by accident – following chart) is projected in order to facilitate the discussion.



Πηγή: Υπ. Γεωργίας, Φυσικών Πόρων & Περιβάλλοντος / Τμήμα Δασών

It is important to realize that since we all are potential arsonists; we must take great care, so we will help in decreasing the number of wildfires.



c) Each group will propose 5-6 slogans in order to make placards or posters to advertise to the public what they should or should not do in order to prevent arsons by accident. The class will then choose the best 15-20 in order to proceed with the construction of the placards or posters that will be presented to the public in the final step.

(3-4 periods)

Step 6)

Wildfires & Climate Change: a burning issue!

Objective: Investigate the extent of forest fires in recent decades, especially under the influence of climate change.

In this step each group is asked to find facts and arguments that are related to the subject of wildfires and the specific category they are dealing with (see 1st step: e.g. weather conditions, causes, negative effects, response, post-fire management measures, prevention measures etc.). One of the groups could be assigned to find and present information on the current fire regime & more especially: frequency, intensity, severity, season, pattern and areal extent (including the geographical distribution) of recent wildfires. Examples of severe wildfires occurring around or outside the fire period (1st of May – 31st of October) should be utilized as well.

The research will be divided in three phases. In the initial stage the teacher guides and gives the groups examples and resources-references which they could utilize. In the intermediate phase each group presents to the class their findings and a discussion / reflexion follows. In the third phase each group constructs a poster entitled “... (title of category) of **Wildfires & Climate Change**”. At the end of this phase the concept map of the group is amended-updated with the notion and links with climate change.

(4-5 periods)

Step 7)

Fire Danger Maps & EFFIS: useful tools to prevent & be prepared.

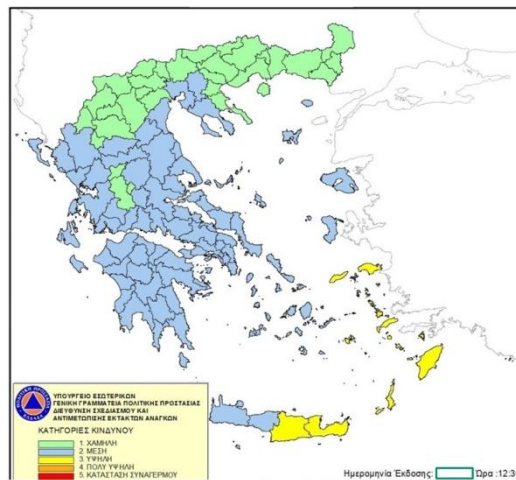
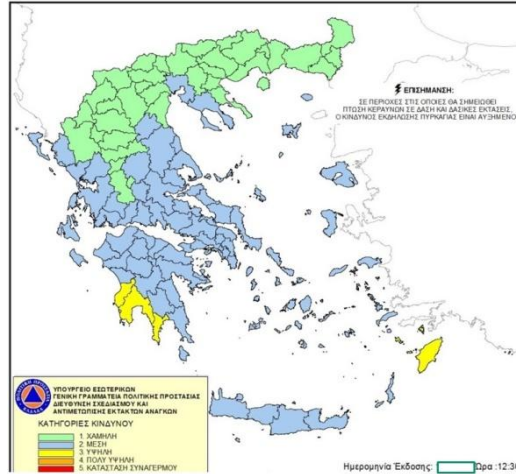
Objective: Demonstrate the positive use of Fire Danger (forecast) Map as early warning system for prevention & preparedness.

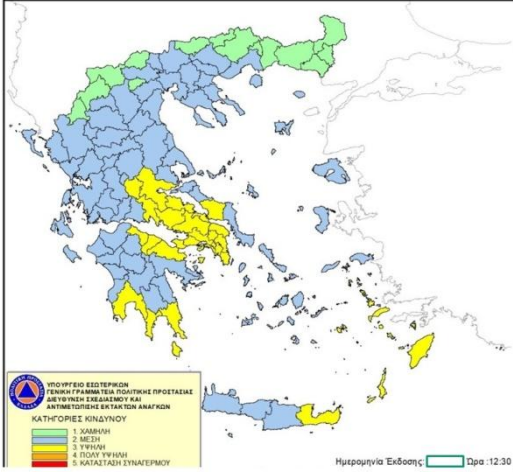
a) The following poll question is asked to the groups as a starting point of this 1st stage of this step: “Do you think that forest fires can be predicted?” After a short discussion in the whole class the following activity is conducted: The teacher gives each group 4 images (not in order) that represent Fire Danger





Maps of Greece issued by the competent authority:



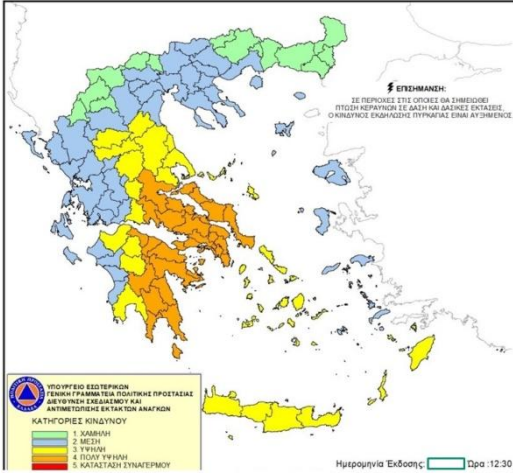


ΥΠΟΥΡΓΕΙΟ ΕΣΩΤΕΡΙΚΩΝ
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ΔΙΕΥΘΥΝΣΗ ΕΚΔΕΛΑΒΟΜΩΝ ΚΑΙ
ΑΝΤΙΜΕΤΩΡΙΣΗΣ ΕΚΤΑΚΤΩΝ ΑΝΑΓΚΩΝ

ΚΑΤΗΓΟΡΙΕΣ ΚΙΝΔΥΝΟΥ

- 1. ΧΑΜΗΛΗ
- 2. ΜΕΣΗ
- 3. ΥΨΗΛΗ
- 4. ΠΟΛΥ ΥΨΗΛΗ
- 5. ΚΑΤΑΣΤΑΣΗ ΣΥΝΑΓΕΡΜΟΥ

Ημερομηνία Έκδοσης: Δρα 12:30



ΕΠΕΞΗΜΑΝΣΗ:
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ΠΤΩΣΗ ΠΕΡΑΝΤΩΝ ΕΣΤΙΝ ΚΑΘΙΣΤΕΣ ΕΚΤΑΚΤΕΣ
ΟΙ ΚΙΝΔΥΝΟΙ ΕΚΔΗΛΩΣΗΣ ΠΥΡΚΑΓΙΑΣ ΕΜΕΙ ΑΥΞΗΜΕΝΟΙ

ΥΠΟΥΡΓΕΙΟ ΕΣΩΤΕΡΙΚΩΝ
ΓΕΝΙΚΗ ΓΡΑΜΜΑΤΕΙΑ ΠΟΛΙΤΙΚΗΣ ΠΡΟΤΑΣΕΩΣ
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Ημερομηνία Έκδοσης: Δρα 12:30

In the legend the 5 scales of fire danger are showed in different colours: low (green) medium (blue), high (yellow), very high (orange) & alarm status (red).

The maps are from consecutive days: 20-23/7/2018 (the date is deleted from the images) and the pupils are asked to put them in the correct order (as shown above).

After putting them in order the teacher reveals that these are the fire danger maps that preceded the great tragedy due to the **fire in Mati** (Attica) on the **23rd of July 2018** that caused 100 deaths! The teacher projects the relative video of how the fire initiated, just a few kilometres away https://www.youtube.com/watch?v=MokHB_1ynY. The main suspect for the



arson was a 65 years old resident of the Penteli area that wanted to burn garden waste <https://www.bbc.com/news/world-europe-47468162> . This stage is concluded with a discussion regarding the responsibilities of the citizens, as well as of the competent authorities, especially when danger is high.

b) Another question is asked to the groups as a starting point of the 2nd stage of the step: “What kind of data should we input in the geographic system that produces such fire danger maps?” The discussion should lead to the factors that are influencing the fire triangle, which are the weather and biomass (fuel) conditions. Then the teacher introduces the European Forest Fire Information System (EFFIS) which is incorporated in the Copernicus Emergency Management Service of the European Union <https://effis.jrc.ec.europa.eu/>. The navigation to the site can be projected in real time (with a PC and projector) in class. Apart from the current situation regarding wildfires in all European countries the users can retrieve various kinds of data for previous time-periods and also recent news of wildfires from various media in the language of the studied country.

(2 periods)

Step 8)

Wildfires: We know, we care, we act! Will you?

Objective: Develop the capacity to present facts, knowledge and ideas to others. Promote fire prevention and knowledge in the community.

A communication event is organized in order to present the outcome of all the previous steps of the project not only to the school community (teachers, students, parents), but also to the local community (could be hosted in the Town Hall or other public space). The concept maps, the messages to the public (placards, posters), posters of the relation to climate change, photographs or videos from the field excursions and other material that was elaborated throughout the project will be presented in this event. The main aim is three-fold:

- Minimize the probabilities of fire initiated by negligence of the citizens
- Inform the public about the implications of climate change
- Inform about the right post-fire management measures and especially the value of natural regeneration and the protection of the burned Mediterranean Ecosystems (in contrast with the often wrongly planned artificial planting of plants and the change of land use).





	(2 periods)
Place (meeting room, outside space, ...)	Classroom, outdoors in some burned areas, in other public agency or institution, the Town Hall or other public space.
Individual and / or collective actions	Individual and team work in groups, construction of concept maps, presentation of work, elaboration of collected material, reflective conversations, promotion of ideas.
Material needed	Computer, video projector, internet access, worksheets, classroom board, paper and cardboard for posters, wood for placards, markers, cameras, etc.
Duration of pedagogical project or activity	X hours 20 - 24 periods Could be developed throughout 2-3 months if an average of 2 periods per week is dedicated to the project.
Evaluation of the new acquired skills	After all the activities, students are expected to: <ul style="list-style-type: none"> - identify the main characteristics of the Mediterranean climate and the main types of vegetation - acknowledge that wildfires are a natural phenomenon and the Mediterranean ecosystems are well adapted to their occurrences - demonstrate good post-fire management practices - acknowledge the role of climate change in the modification of the fire regime as well as the positive feedback mechanism (loop) on the phenomenon - utilize the fire danger maps for fire prevention and to get important data through the EFFIS tool. - promote efficiently the idea of wildfire prevention to the public <p>In the final step a questionnaire could be given to the audience in order to evaluate the communication event (and through it the effectiveness of the students' work).</p>
Eco-citizen adaptation, knowledge	Reflection of the impacts of climate change to the major problem of wildland fires.





<p>enhancement and links to other topics</p>	<p>Enhance prevention measures. Prepare the community for a phenomenon that is likely to happen. Inform the community of best practices in post-fire management. Link to: Activity EnK2 and Project EnK2 creation of a smartphone app Project Save Biodiversity in Danger! Knowledge Wildfires in Mediterranean countries and Climate Change And Major natural risks</p> <p>Greek:</p> <ul style="list-style-type: none"> • ALREADY AVAILABLE IN THE SHEET <p>French:</p> <ul style="list-style-type: none"> • Local Données générales: http://www.cypres.org/risques-naturels/feu-de-foret/ • Video CC et risques d'incendies: https://www.youtube.com/watch?v=xxtmzSbNP8
<p>Observations</p>	<p>This project with the successive 8 steps, as a whole, has been created for the needs and purposes of the Click for Schools Project (Intellectual Production O2). However, a few stages/activities, like the initial brainstorming and 5b, have already been a part of the educational programme of Argryroupolis Center for Environmental Education (ACEE) "Forest fires - causes, prevention, restoration of the landscape" (http://www.kpea.gr/forest_fires.php - in Greek).</p>

Pictures

Photo. (Organization that took the picture) Country



