NATURAL REGENERATION AND RESTORATION FOREST ECOSYSTEMS AFTER WILDFIRE IN NORTH EVIA

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Introduction

This study was funded by Lidl Hellas, concerns the mapping of the wider situation of the burned forest areas caused by the catastrophic fire of August in 2021 and aims to restore the affected forest ecosystems. In the Mediterranean zone, the ecosystems of the *Pinus halepensis*, the evergreen broadleaves and the warm-living broadleaves (*Quercus sp*. and *Castanea sp*. forests) are adapted to fires and they regenerate easily after them. The Pines with seeds and the broad-leaved species with paravegetation. A problem of natural regeneration of forest ecosystems after the fire exists in *Pinus nigra* and *Abies sp*., as these species are not adapted to fires, due to their distribution zone. Specifically, it was observed that the *Pinus halepensis* has begun to regenerate to a satisfactory degree according to inspections which were carried out. As for slopes, at low slopes the regeneration is very good, while as the slope increases, a relative decrease is observed. It should be noted that in the places where the burnt trees have been felled and anti-erosion works have been carried out, so by extension the soil has been disturbed and retained, the number of plantings was even greater. The position on the slope also plays an important role in regeneration. In addition, in the places where there were no dry branches, fallen and abandoned trees but also the undergrowth was not intense, more new seedlings were observed. In sites with a lot of undergrowth the regeneration was not so good and still, the plantings were very small in height. Our observations show that the height of the seedlings generally does not exceed 30cm.

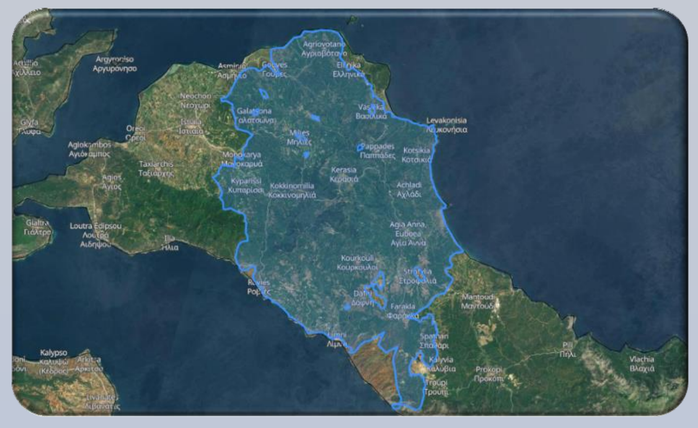

Figure 1. *Burned- Study area*

Results- Conclusions

The present study is about the mapping of the wider situation of the burned forest areas caused by the catastrophic fire of August 2021 and aims at the rational selection of areas for reforestation. The study area is located in the northern part of the Evia Prefecture.
Most of the forests that burned in Northern Evia were clusters of *Pinus halepensis*. Also, smaller areas with clusters *of Pinus nigra*, *Abies sp.* and *Quercus sp*. Burned. A large part of the burned forests has burned again in the past. Slopes are generally moderate in the burned forest areas, but there are areas with slopes over 50%.

Figure 2. *Pinus halepensis* forests are expected to be restored naturally; *Pinus halepensis* with seeds, and the broad-leaved species (deciduous and evergreen) with paravegetation.

Figure 3. In the last autopsy in the study area in February 2023, young individuals were identified who are in both the 1st, 2nd and also the 3rd growth period.

Figures 4,5. Regarding the other two dominant species, *Pinus nigra* and *Abies sp*., the results were as expected, very sparse to sporadic natural regeneration for *Pinus nigra* and almost nil for *Abies sp*.

In addition to natural regeneration, restoration also concerns areas that for protective and aesthetic reasons require a different approach (near settlements and other areas of tourist or recreational interest). It is proposed to create around the settlement, for the first time, in order, three fire protection zones in a width ratio of 1:2:3 (indicative 50, 100 and 150 m), to:

- Fire protection of settlements in the mixed zone with forest lands
- Creating fire protection projects in harmony with the natural environment
- Creating a sense of security and aesthetic regeneration for the residents of the forest-dwelling settlements with light-giving opening of the forest vegetation.

Zone 1, 50 m wide, with no vegetation. It serves as a passageway for firefighting vehicles and ground forest firefighting forces. Fire hydrants connected to the settlement's water system must be installed along it.
Zone 2, 100 m wide, planted with as fast-growing and fire-resistant broad-leaved species as possible, trees and shrubs, in a 3X3 m planting link. *Quercus pubescens* and *Cercis siliquastrum* are suitable less flammable species with immediate commercial availability. As a second option, fire-resistant and drought-resistant species such as *Tamarix hampeana* and *Ceratonia siliqua* can be used, but these are slow-growing. Finally, the planting of xerophytic Mediterranean shrubs will have beneficial effects on soil properties and the habitat of wild fauna.
Zone 3, 150 m wide, *Pinus halepensis Mill*. thinned with agricultural logging in a 4X4 m planting link (40 to 50 trees per hectare). The crowding rate will not exceed 50%. Also, trees should be pruned up to 1/3 of the total length of the crown. Also, it is necessary to remove the subsoil vegetation, including the natural regeneration in the dense vegetation stage (known as 'brush'). Thus, the horizontal and vertical continuity of the forest fuel will be broken up, the probability of starting a forest fire or the creation of new foci will be reduced, the thermal intensity of the fire front will be reduced and its spread will be slowed down. All these conditions facilitate the work of forest firefighting and make aerial drops of firefighting aircraft absolutely effective **(Figure 5)**

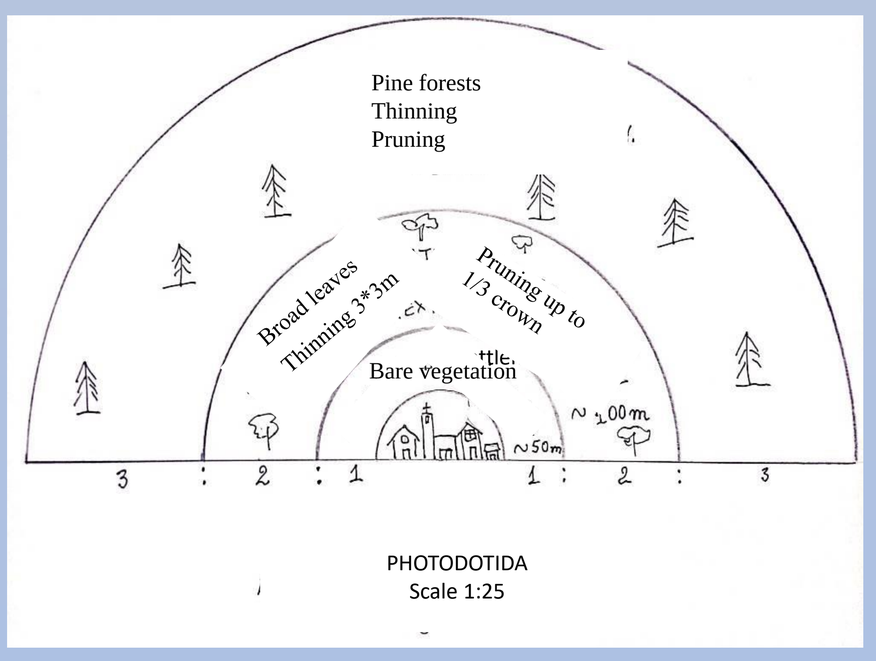

Figure 5

Suggestions

The villages of Gouves (Municipality of Istiaea - Edipsos) (**Figure 6)**.and Achladi (Municipality of Mantoudi - Limni - Agia Anna) (**Figure 7**), in Northern Evia were selected as a pilot application of the "PHOTODOTIDA" fire protection zone system. Both villages were at risk and were evacuated during the catastrophic fire of North Evia on August 8, 2021. Their selection was made based on their fire risk and the particular conditions they present in terms of preventive fire planning. The system of perimeter zones is distinguished in terms of the measurement and costing of the works in two arcs (parts), on either side of the provincial road:
The northern divided into sections: Ia, IIa, IIIa, and the southern divided into sections: Ib, IIb, IIIb.

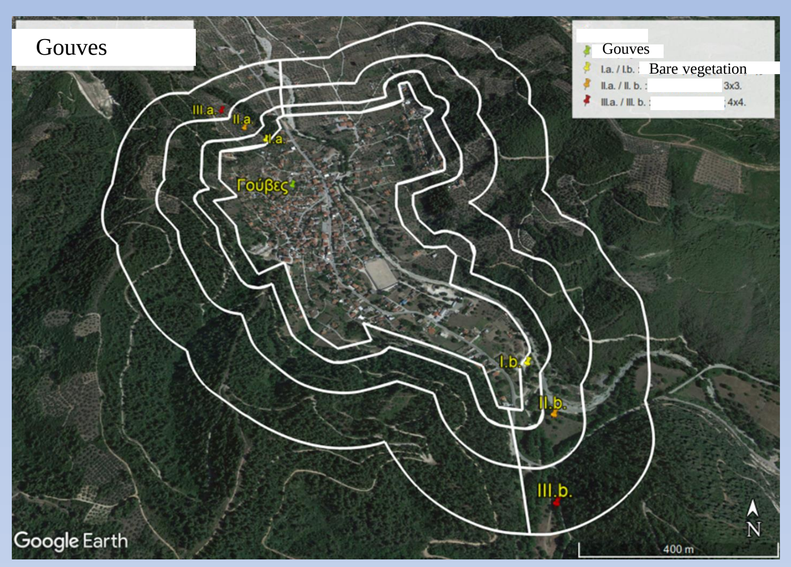

Figure 6. *Gouves*

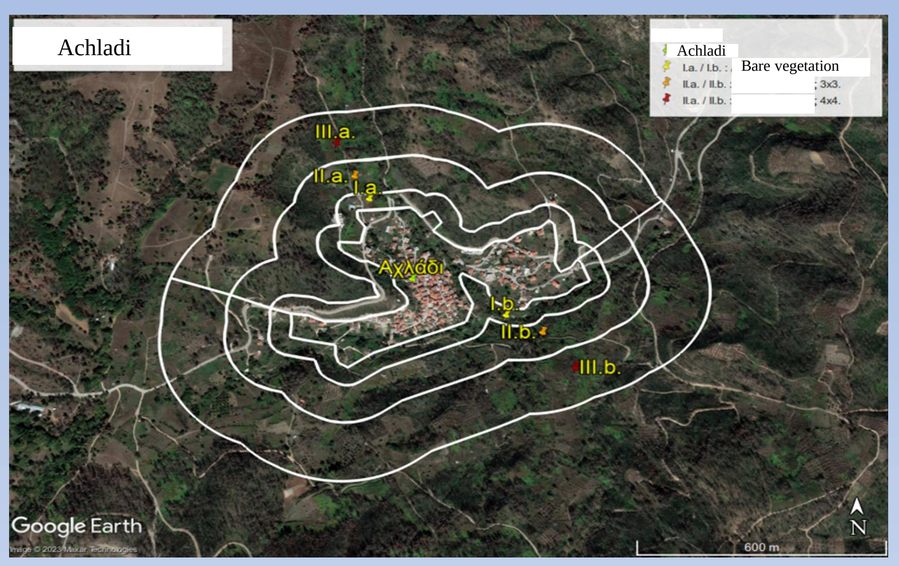

Figure7. *Achladi*