Conference
Rooting for #3BillionTrees
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Post Fire Management in Cyprus (The Solea Forest Fire)

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Introduction

The presentation includes a case study of post fire management plan, conducted for a burned area in Cyprus in 2016.

The Purpose of the Plan is to determine the appropriate measures in the burned area, so as to achieve the reforestation of the area, by:

- The management of burnt timber,
- The anti erosion measures, as well as the reduction of flooding risk,
- The re-establishment of vegetation,
- The restoration of natural and cultural heritage elements,
- The nature conservation and biodiversity in the area (flora and fauna) and
- The restoration of the forest ecosystem.

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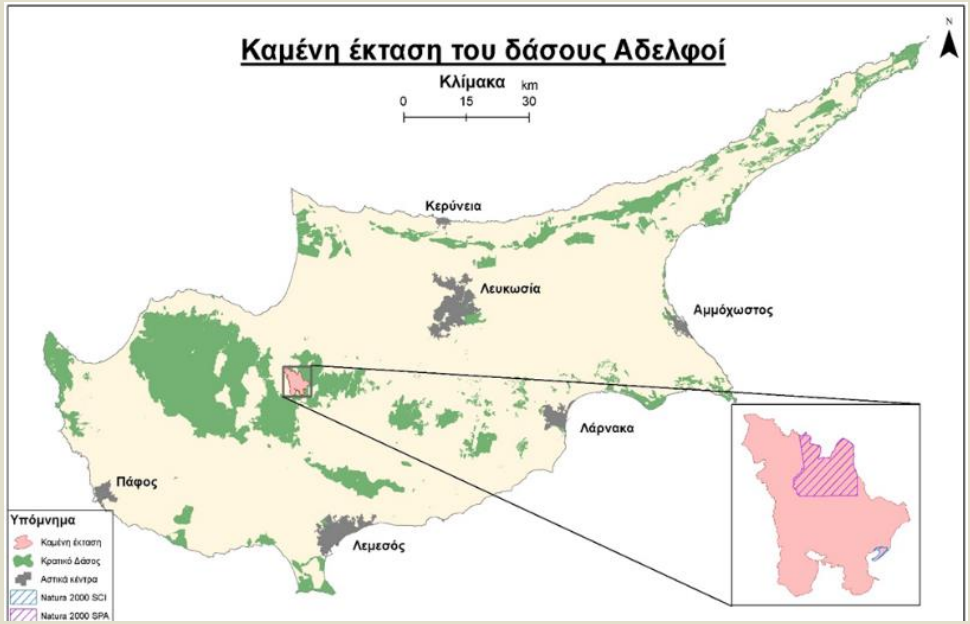
Post-Fire Management Plan of Solea Area

The fire was detected by a ground patrol on 19th of June 2016, it burned 17,03 km^2.

- 60 fire engines
- 1162 Forest Officers and firemen and
- 7 other Governmental Services
- 22 aerial means

On the 20th of June the European Civil Protection Mechanism was activated requesting assistance through the European Emergency Response Coordination Center for aerial forest fire module using airplanes.



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Introduction

Post Fire Area Assessment by the Department of Forests

The Post-fire Management Plan included:

i. Burnt logwood volume estimation (Fuelwood and commercial value)
ii. Forest vegetation restoration techniques,
iii. Soil erosion and flood mitigation measures,
iv. Cost estimation of the project implementation,
v. Project implementation and monitoring,

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Salvage Logging

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Salvage Logging

Logging and removal of burnt standing timber are aiming to:

i. The preservation of the top soil and the recovery of its properties,

ii. Reduction of the risk of the appearance of harmful insects due to the large volume of burnt wood,

iii. Accelerate breakdown of hydrophobic topsoil during salvage logging, while improving infiltration capacity and

iv. Increase land cover from logging residues.

SOIL EROSION AND FLOOD MITIGATION MEASURES

- Topography, climate, geological substrate, composition and vegetation structure, significantly influence runoff water.
- Loss of vegetation along with differentiation of top soil properties increase the possibility of flooding phenomena
- The hydrological balance is expected to be restored gradually through reforestation.

SOIL EROSION AND FLOOD MITIGATION MEASURES

Contour log-terraces

Contour log-terraces aimed to reduce soil erosion and improve soil conditions for successful regeneration of pine species. Contour log-terraces are rows of burnt logs, approximately 15-30 cm in diameter, set along contour lines.

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SOIL EROSION AND FLOOD MITIGATION MEASURES

Drystone constructions

Drystone construction is the masonry built without mortar (mud) and with a relatively small, on-site stone processing. Enhancing biodiversity and provide shelter for flora and fauna species.

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SOIL EROSION AND FLOOD MITIGATION MEASURES

Opening of shallow grooves on the slopes and placing stones on the underside

The purpose of this measure was to prevent soil erosion and to create suitable conditions for the successful regeneration of *Pinus brutia*.

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SOIL EROSION AND FLOOD MITIGATION MEASURES

Wooden check dams

Wooden check dams are temporary artificial dams made of burnt logs which were raised within small streams and small gorges.

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SOIL EROSION AND FLOOD MITIGATION MEASURES

Gabions

Gabions are permanent artificial works (series of cable cages, filled with stones) which in the particular case were constructed in the beds of large streams where floods were more likely to occur after intense rainfall.

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SOIL EROSION AND FLOOD MITIGATION MEASURES

- **Straw bale check dams**

These dams are temporary artificial works and were built in small streams and small gorges where rectangular prism shaped straw bales were placed perpendicular to the stream flow.

- **Earthen check dams**

These dams are classified as forestry projects that help to stop the flow of sludge and improve the anti-erosion protection of the bed of small streams.

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REFORESTATION OF THE BURNED FOREST

Measures to restore vegetation in the burned area, taking into account the ecological conditions both before and after the fire, such as:

- the composition and structure of the pre-existing vegetation,
- the intensity of the fire,
- the existence of living trees or not,
- the existence of a necessary quantity of seed on the burned trees or in the soil,
- the topography and
- the climate of the area.

The fire resilience capability of the Mediterranean ecosystems relies on the adoptive mechanisms the various species of plants developed over time because of the impact of the fire.

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REFORESTATION OF THE BURNED FOREST

- Calabrian pine (*Pinus brutia*), the main tree species at the burnt area, is characterized as pyrophilous species.
- Calabrian pine retains closed cones in the crown, which after the effect of the high temperatures of the fire are opened and thus the seeds are dispersed in the surrounding area.
- After the fire occurrence the entire area is assessed so as to map the natural reserves of pine tree seeds and declare them as natural regeneration areas. The areas where there are no natural reserves of pine trees seeds are treated artificially.

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REFORESTATION OF THE BURNED FOREST

Sowing technics

- Spot sowing
- Broadcast sowing

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REFORESTATION OF THE BURNED FOREST

Pit planting

REFORESTATION OF THE BURNED FOREST

Cultivation of existing and construction of new terraces

The particular treatment had been applied to areas where terraces have been established in the past along contour line and there were no natural reserves of pine-tree seeds.

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REFORESTATION OF THE BURNED FOREST

Irrigation of the plants

To ensure a high survival rate, the plantations had been irrigated during the growing season of the followed three years, 2016, 2017 and 2018. For this purpose, the Department of Forests, established irrigation networks or the plants were manually irrigated by the use of mobile water tanks, loaded

BIODIVERSITY ENHANCING MEASURES

- Delimitation of the distribution area of the endemic species, *Crocus hartmannianus*
- *Crocus hartmannianus* seed collection for their preservation in the seed bank
- Placement of waterers in selected points, supported by water tanks of 1000 L capacity
- Enhancement of the stream flow on rocky positions, for the creation of water ponds
- Placement of artificial nests for supporting the nesting of the local bird species
- Placement of artificial bat boxes
- Fruit tree planting (plant purchase and fencing),
- Construction of small ponds.

The rare endemic plant *Crocus hartmannianus*

Construction of artificial water ponds

RESTORING AND ENHANCING THE CULTURAL HERITAGE AND RECREATION FACILITIES

A number of measures have been taken to restore and enhance cultural heritage and recreation facilities, such as:

- Construction of informational sings at both burnt areas (i.e. Dead-end roads for public safety, or funding and/or co-funding information of various projects).
- Treatment and irrigation of the nature monument tree “Dris tou Laona”,
- Signs replacement and damage repair at EOKA hideouts,
- Promotion of the 17th century settlement “Karterouni”,
- Maintenance of the local nature trail and creation of a bypass trail of 350 m length,
- Replacement of the destroyed signs and creation of new signs for the new route of the above trail,
- Construction of an info kiosk for the promotion of the nature trail,
- Repair of the facilities of a view point.

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MEASURES TO MONITOR THE OCCURRENCE OF OUTBREAK OF WOOD BORER INSECTS AND BARK BEETLES

After large forest fires, populations of wood borer insects and bark beetles show an increase, which usually reaches epidemic levels.

The Department of Forestry, in the context of preventive treatment of the above problem in the burned area of the Adelphi Forest, decided to install 30 pheromone insect traps in selected positions to trap adults of wood borer insects and bark beetles. The purpose was to monitor the populations of these insects, at least for the next five years, in order to evaluate their populations and of course the corresponding risk of causing new diebacks.

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MONITORING THE EFFECTIVENESS OF RESTORING MEASURES

Monitoring the effectiveness of soil erosion and flood mitigation measures

The performance of soil erosion and flood mitigation measures was assessed based on the volume of transported materials that was retained upstream of these works, as well as their contribution to the successful re-establishment of vegetation.

Installation of erosion monitoring sites for five years.

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MONITORING THE EFFECTIVENESS OF RESTORING MEASURES

Monitoring the effectiveness of regeneration and fauna restoration measures

- Regeneration Monitoring Sites
- Fauna population Monitoring Sites

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Thank you