



LIFE ADAPT-ALEPPO (LIFE20 CCA/ES/001809)

"Adaptive management of Mediterranean Pinus halepensis forests in the face of climate change"

AFTERLIFE COMMUNICATION PLAN

LIFE ADAPT-ALEPPO





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EXECUTIVE SUMMARY OF THE AFTER-LIFE COMMUNICATION PLAN

This report summarizes the results of the LIFE Adapt-Aleppo project, highlighting the most relevant achievements from a transfer and replicability perspective. It also presents a plan to continue disseminating and transferring the outcomes of the actions carried out during the project in the years following its completion, with the aim of multiplying the project's impact beyond the funded period.

The After-LIFE Communication Plan covers a five-year period following the end of the project (September 2025-August 2030)





LIFE ADAPT-ALEPPO

2.1. PROJECT PARTNERS

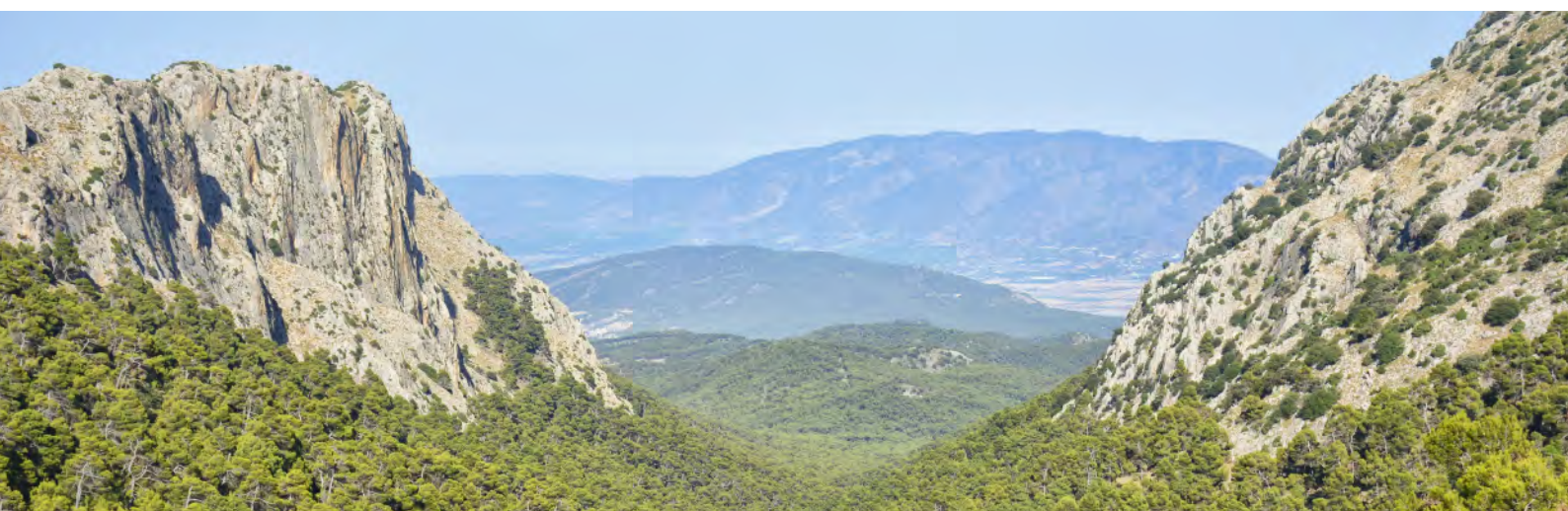
The coordinating beneficiary is the consultancy **Ingeniería del Entorno Natural S.L. (IDEN)**, which has developed the project together with the associated beneficiaries: **Agresta S. Coop.**, the **Directorate-General for Natural Heritage and Climate Action of the Region of Murcia (CARM)**, the **University of Castilla-La Mancha**, the **University of Lleida**, and the **Polytechnic University of Valencia**.



2.2. PROJECT OBJECTIVES

The LIFE ADAPT-ALEPPO project (LIFE20 CCA/ES/001809) – “*Adaptive management of Mediterranean Pinus halepensis forests in the face of climate change*” – is a Spanish project funded under the 2020 LIFE Programme call, within the Climate Action subprogramme, under the thematic area of vulnerability assessment and adaptation strategies.

The main objective of the project is to develop new tools to support the adaptation of Iberian Aleppo pine forests (*Pinus halepensis*, habitat subtype 42.841 of habitat 9540, Annex I of the Habitats Directive) to climate change, and to demonstrate their effectiveness through on-the-ground application. These tools focus on the early detection of forest decline processes and on improving the resilience, vigor, adaptive capacity to increasing aridity, and post-disturbance recovery of these ecosystems.



2.3. PROJECT DURATION AND ACTIONS

A TOTAL OF 21 ACTIONS WILL BE IMPLEMENTED BETWEEN SEPTEMBER 2020 AND AUGUST 2025.

PREPARATORY ACTIONS

Selection of demonstration plots and identification of previous experiences, as well as the establishment of cooperation agreements with an expert advisory committee.

IMPLEMENTATION AND MONITORING ACTIONS

The main technical actions of the project include:

Implementing adaptive management demonstration actions in Aleppo pine stands, developing a habitat suitability map and a remote sensing-based early warning tool to detect forest decline.

Implementing and monitoring assisted migration actions aimed at improving the forest ecosystem's capacity to adapt to climate aridification.

Implementing and monitoring silvicultural treatments designed to improve stand vitality and reduce the effects of water scarcity.

Implementing and monitoring silvicultural treatments to enhance structural and floristic heterogeneity, increasing ecosystem response diversity to disturbances.

Implementing and monitoring adaptive management techniques for post-fire regeneration, to improve the resilience and adaptive capacity of Aleppo pine stands.

These actions also include the transfer and replicability of the methodologies developed, as well as the monitoring of the impacts generated by the project.

COMMUNICATION AND DISSEMINATION ACTIONS

Communication and dissemination of the project context, the techniques and solutions developed, and the main conclusions obtained.

The target audience includes forest owners, forest managers and technical staff, local authorities (both technical and political profiles), and the general public.

Networking activities are also carried out with other projects and related initiatives.

MANAGEMENT AND COORDINATION ACTIONS

Actions aimed at ensuring the correct technical, administrative and financial implementation of the project.



2.4. AREAS OF ACTION

THE GEOGRAPHICAL SCOPE OF THE PROJECT COVERS THE POTENTIAL DISTRIBUTION AREA OF THE ALEPPO PINE HABITAT SUBTYPE IN THE IBERIAN PENINSULA, INCLUDING THE MEDITERRANEAN SLOPES OF THE CATALAN MOUNTAIN RANGES, THE IBERIAN SYSTEM, THE EBRO BASIN AND THE PRE-BAETIC MOUNTAIN RANGES.

C2

- Peña Parda.
- Umbria y Solana Cabeza del Asno.
- Cabezo de los Ciervos.
- Sierra de la Pila (2).
- Baronía de Otonel.
- La Serratilla (2).
- Bardena baja.
- Sierra y Serrata del Puerto.
- Almagra y Cerro Gordo.
- Las Fajas.
- Can Gol (2).

C3

- Taibilla (2).
- Pinar de Almansa.
- Mont-Roig Sant Llorens
- Montero Sant Jordi (2).
- Can Pons.
- Los Pueyos, Terreno Royo, Valdeoliva y otros (2).
- Los Mons (3).
- Las Fajas (8).
- La Hunde y La Palomera (2).

C4

- Sierra de Ricote.
- Dehesa Carnicera y Cuesta mala (4).
- Cabezo Negro.
- Cabezo de Tirieza y otros.
- Can Pons.
- La Muela, Roquetillo, Feliciano.
- Las Atalayas.
- Garriga de Boada.
- Pinar y Dehesa.
- Las Morericas.

C5

- Agramon.
- Pinar de Almansa.
- Peña Parda.
- Can Tobella (2).
- Dehesa Alta, Sierra, Lid y otros (4).
- Cal Vila (2).
- La Muela, Roquetilla, Feliciano.
- Penya Parda.

The regions where the project is being implemented are mainly:

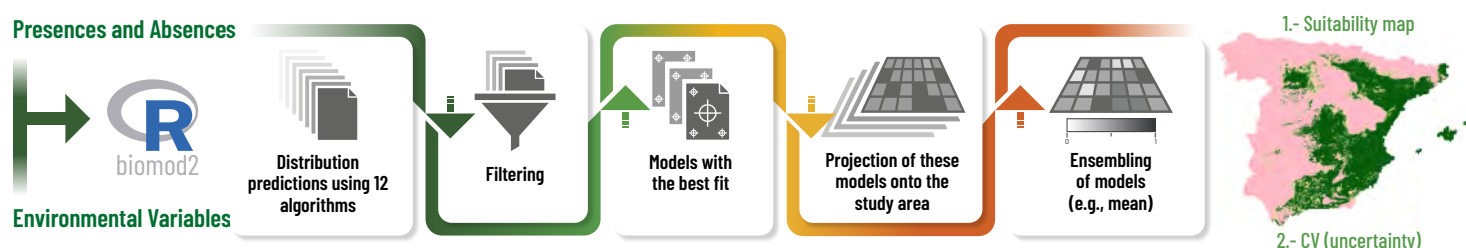
- MURCIA
- ARAGÓN
- CATALUÑA
- CASTILLA-LA MANCHA
- COMUNIDAD VALENCIANA

RESULTS AND MILESTONES ACHIEVED

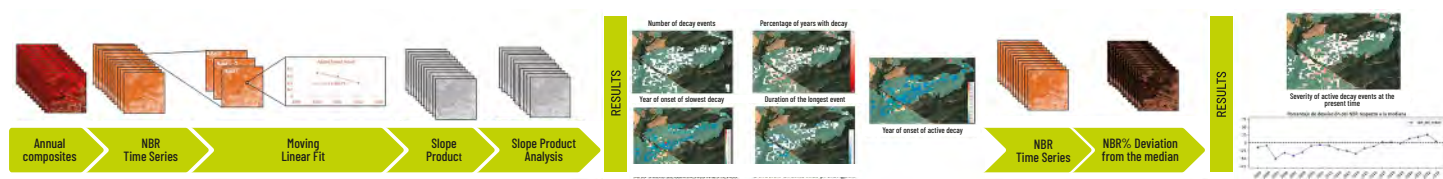
3.1. METHODOLOGY OF DEMONSTRATIVE WORKS

A. Continuous monitoring of forest decline

The methodology applied in the LIFE ADAPT-ALEPPO project for developing current and future habitat suitability maps for Aleppo pine is shown in the figure below:



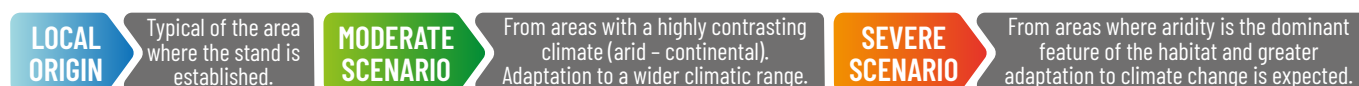
Furthermore, spatial models have been produced to detect and characterize decline processes in Aleppo pine stands through algorithms that analyse time series of satellite imagery.



B. Assisted migration

LIFE ADAPT-ALEPPO has selected Aleppo pine provenances from different regions, including populations already adapted to drier and warmer conditions, and planted them in areas expected to be more suitable under future climate scenarios. This approach increases knowledge of how different genetic origins respond to expected climatic conditions and contributes to building more resilient forest populations in the long term.

Plantations were carried out over approximately 60 hectares across 12 stands in the provinces of Zaragoza, Barcelona, Castellón, Valencia and Murcia. For each site, two local provenances, two from moderate conditions, and two from severe conditions were used. In addition, woody companion species were selected based on the natural floristic assemblage of each *Pinus halepensis* stand, reflecting the bioclimatic characteristics of each area.

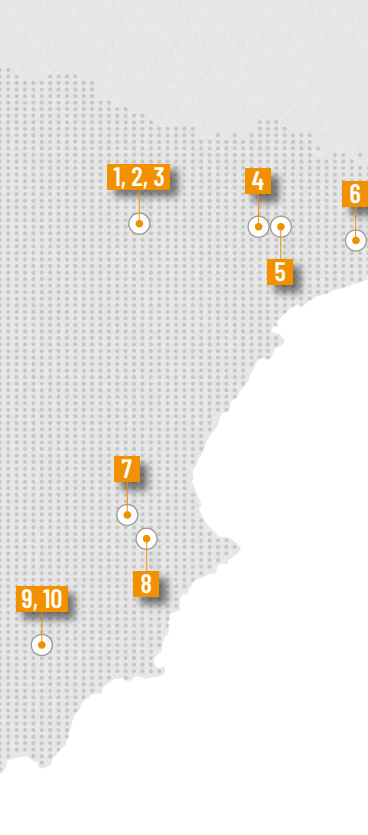
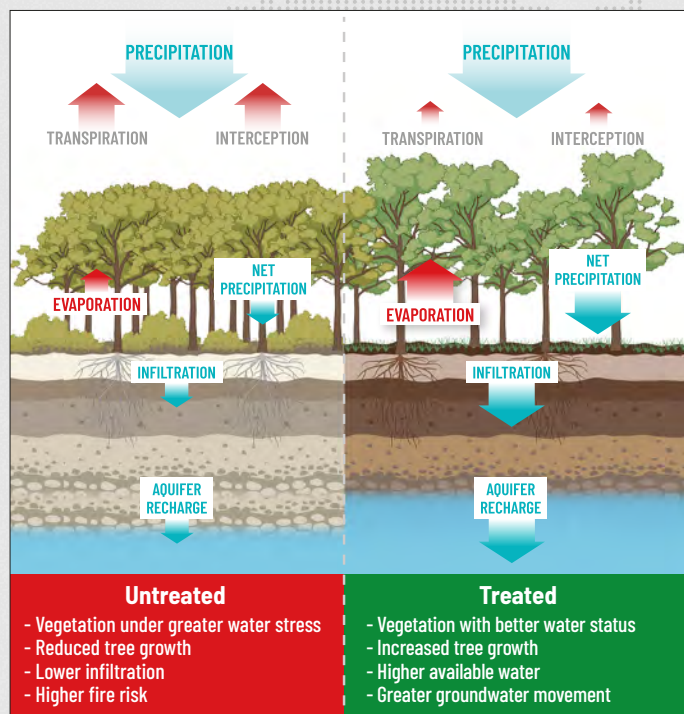


The project implemented assisted migration under two typologies:

- Degraded Aleppo pine forests: continuous plantations in rows or blocks.
- Mature Aleppo pine forests lacking regeneration and with canopy gaps: scattered/irregular planting.

C. Ecohydrological- Based Forestry

The LIFE ADAPT-ALEPPO project has tested different silvicultural treatments in order to identify the most suitable thinning structure and final stand density to maximize ecohydrological benefits. Nine demonstration stands were treated across the Mediterranean basin, applying thinning by alleys or strips, coppice-group, and homogeneous thinning.

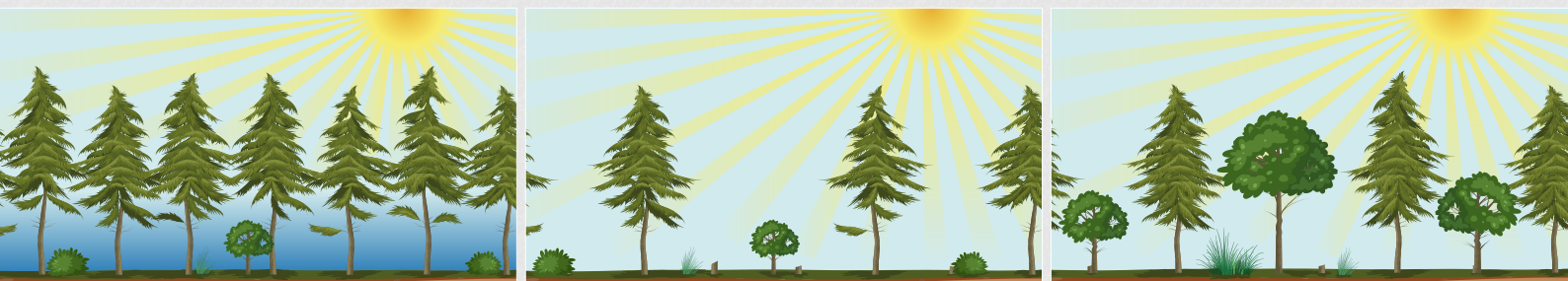


- 1 Sierra de Luna**
8.4 + 7.0 ha | Intensity = 25%
Alleys
- 2 Strips 1**
2.69 + 3.2 ha | Intensity = 25%
5m alleys with 15 m inter-row spacing
- 3 Strips 2**
2.68 + 0.72 ha | Intensidad = 50%
5m alleys with 5m inter-row spacing
- 4 Santa Anna**
Not yet executed, planned along alleys
- 5 Camarasa**
9 + 3.2 ha | Intensity = 60% - Alleys
- 6 Can Ponç**
Alleys: 1 + 0.75 ha | Intensity = 50%
Homogeneous: 5.5 + 0.75 ha | Int. = 50%
- 7 La Hunde**
Not yet executed, planned by alleys and intensity = 35%
- 8 Almansa**
4 + 1 ha - Alleys
- 9 Nerpio - homogeneous**
2.13 + 1 ha | Intensity = 60%
Homogeneous
- 10 Nerpio - coppice-group cuts**
2.13 + 31 ha | Intensity = 60%
Homogeneous

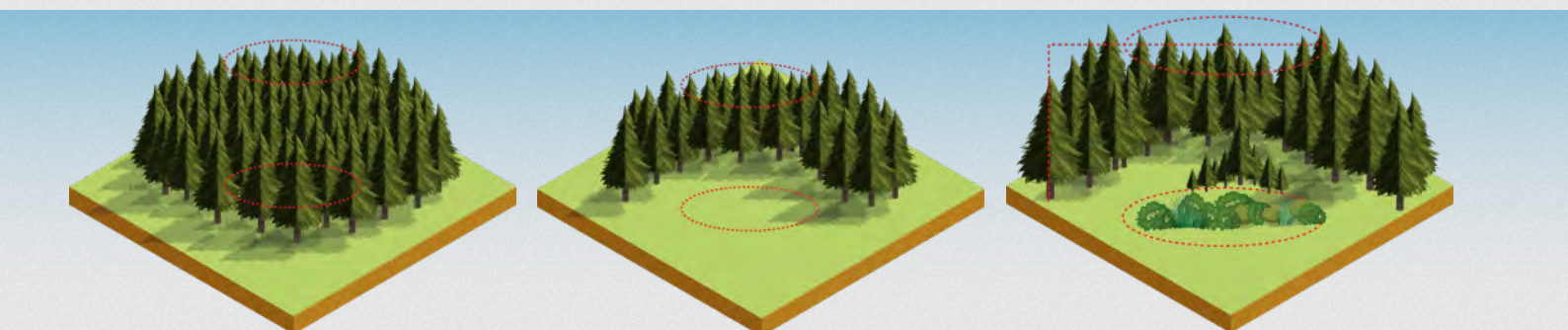
D. Silviculture for Floristic and Structural Diversification

The diversification treatments implemented in Aleppo pine stands were structured into five typologies: three targeting the promotion of pine or mixed regeneration, one aimed at releasing companion species from competition, and one focusing on maintaining or promoting irregular stand structures:

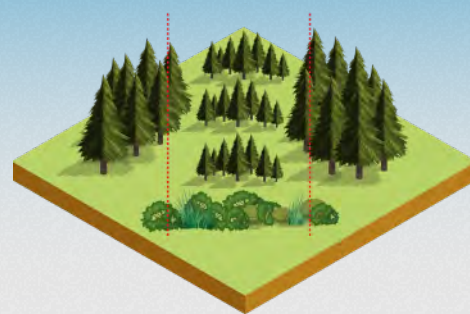
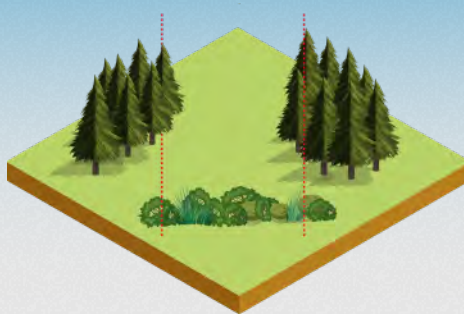
SELECTIVE AND/OR MIXED THINNING



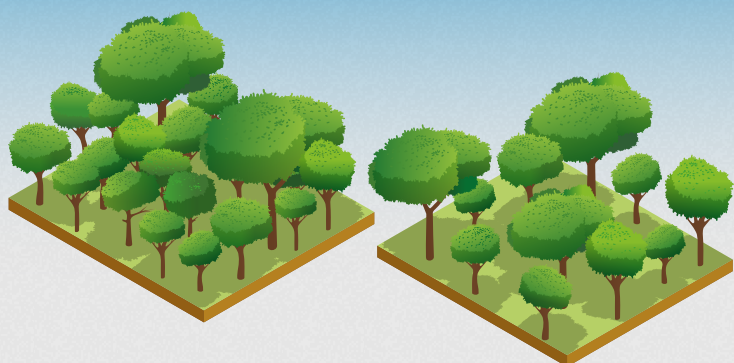
COPPICE-GROUP REGENERATION TREATMENTS



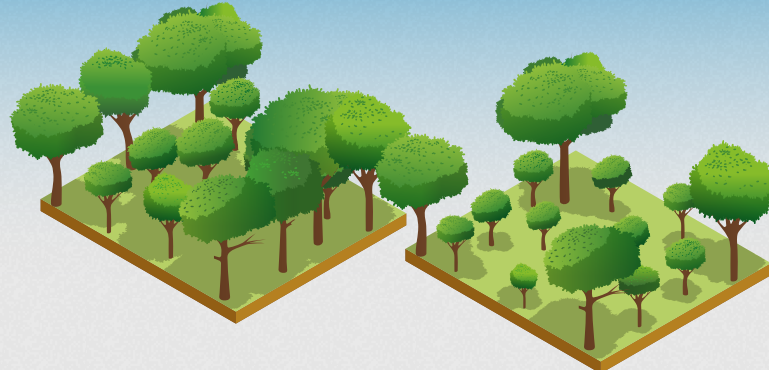
REGENERATION TREATMENTS USING STRIP OR GIRDLE OPENINGS



REGULARIZED THINNING



UNIFORM SUCCESSIVE THINNING



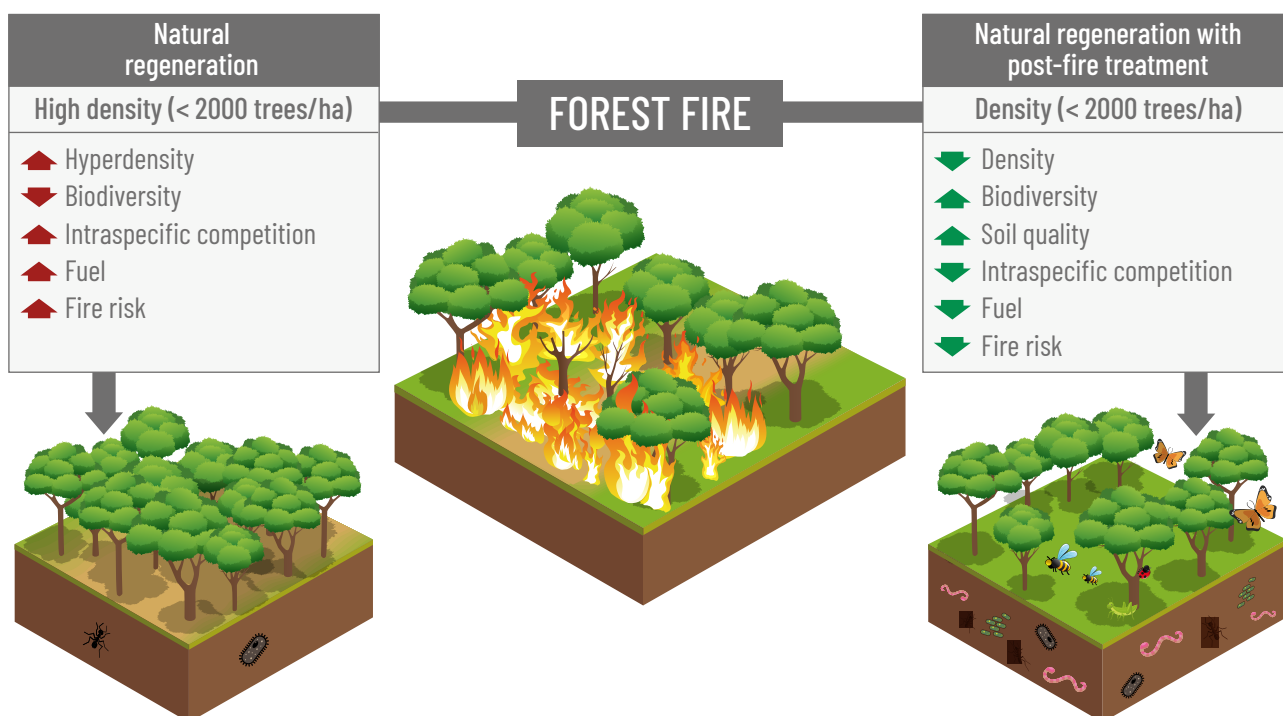
E. Post-Fire Regeneration

Through thinnings of varying intensity, the objective is to optimize stand structure and soil conditions to improve the adaptive capacity of Aleppo pine to climate change, while reducing future wildfire risk and limiting fire severity when events occur.

Post-fire adaptive management techniques were implemented in nine stands across eastern Spain (Catalonia, Aragón, Valencian Community and Castilla-La Mancha), consisting of very intensive thinning operations (>90% tree reduction), resulting in two target post-treatment density ranges:

TYPE 1: 900 - 1200 trees/ha

TYPE 2: 1300 - 1800 trees/ha



3.2. SUMMARY OF RESULTS ACHIEVED

Following the completion of the project, after the initial four years for which it was planned, the main results obtained through its implementation are:

Results Continuous monitoring of forest decline

An early-warning tool for detecting forest decline has been developed:

<https://lifeadaptaleppo.agrestaweb.org/>

The tool has been promoted through numerous events and explanatory videos on social media, reaching a wide audience of forestry professionals.



Assisted Migration Results

First-year survival ranged between 50% and 70%, with better performance in provenances adapted to moderate scenarios (Levante Interior, Ibérico Aragonés, Alacuás – seed orchard).

Local provenances showed slightly lower resistance to summer drought, whereas the most xeric provenances displayed high and stable survival under arid conditions.

A transferable assisted migration methodology applicable to future habitat restoration efforts has been consolidated.

Ecohydrological- Based Forestry Results

A reduction in water stress and an increase in water-use efficiency (WUE) were recorded. In most stands, NDVI and vigor indicators increased by 10–20% after intervention.

Ecohydrology-based silviculture significantly increased soil water availability, improving infiltration and deep soil moisture.

In stands without severe summer drought, ecohydrological treatments showed potential to increase blue water yield.

Floristic and Structural Diversification Results

Average understory species diversity (Shannon Index) increased by +35%, and the number of woody companion species increased from 3.1 to 6.8 species per stand.

Understory microclimate conditions improved, along with the natural regeneration of hardwood species.

Targeted diversification in Aleppo pine stands enhanced their preparedness for climate-driven disturbances.



Post-fire management results

Treated stands displayed better height growth (+28%), lower mortality (-15%), and higher soil water availability (+20%) compared to untreated controls.

Natural regeneration of companion species increased in both diversity and cover.

Global results

Adapt-Aleppo assisted migration and innovative forestry treatments have generally achieved the objectives set for improving direct and indirect indicators of climate change adaptation:

The 42 monitored stands (204.48 ha) demonstrate that adaptive management strategies significantly improve both the functional and structural resilience of Mediterranean Aleppo pine forests.

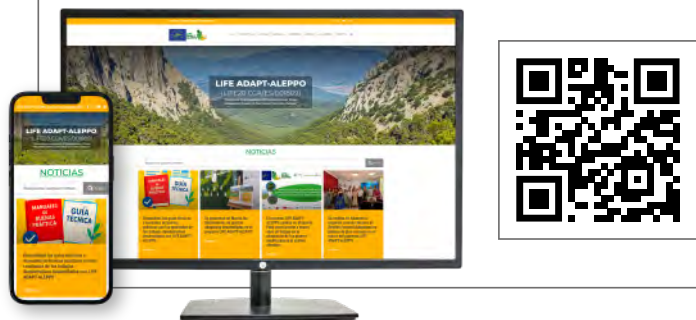
Key adaptation indicators were validated: survival, vigor, water efficiency, floristic diversity and structural stability.

Ecohydrological silviculture, diversification and assisted migration are confirmed as core pillars for climate change adaptation in Mediterranean forests.

Replicable management protocols were delivered for forest managers and public administrations.

Communication and dissemination

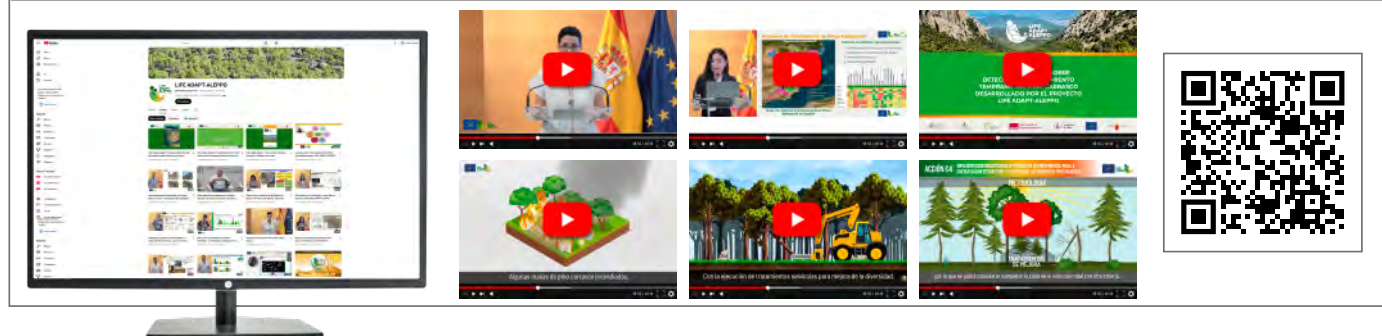
Website in Spanish and English
<https://adaptaleppo.eu/>



Eight editions of the project newsletter
<https://adaptaleppo.eu/multimedia-2/>



Informative and technical videos presenting methods and results: :
<https://www.youtube.com/@lifeadapt-aleppo8166>



Social media

@adaptaleppo

6 TECHNICAL GUIDES



Implementation of assisted migration technique in the forest restoration of Aleppo pine habitat.



https://adaptaleppo.eu/wp-content/uploads/2025/03/AdaptAleppo-GT_02_lr.pdf



Implementation of silvicultural techniques for structural and floristic diversification in Iberian Aleppo pine forests.



https://adaptaleppo.eu/wp-content/uploads/2025/03/AdaptAleppo-GT_04_lr.pdf



Modeling and remote sensing techniques for the adaptive management of Iberian Aleppo pine forests.



https://adaptaleppo.eu/wp-content/uploads/2025/03/AdaptAleppo-GT_01_lr.pdf



Implementation of ecohydrological silviculture in Iberian Aleppo pine forests.



https://adaptaleppo.eu/wp-content/uploads/2025/03/AdaptAleppo-GT_03_lr.pdf



Implementation of adaptive silviculture techniques in post-fire regeneration of Aleppo



https://adaptaleppo.eu/wp-content/uploads/2025/03/AdaptAleppo-GT_05_lr.pdf

SCIENTIFIC AND TECHNICAL PAPERS

PUBLICATIONS AVAILABLE AT: [HTTPS://ADAPTALEPP0.EU/MULTIMEDIA-2/](https://adaptaleppo.eu/multimedia-2/)

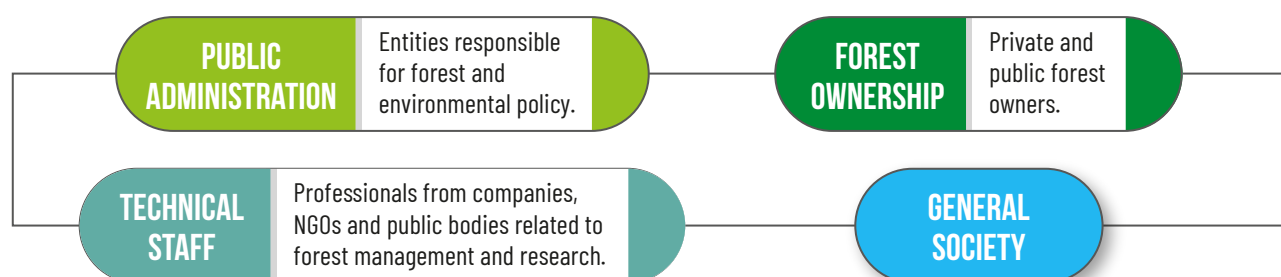




PROGRAM OF ACTIONS OF THE AFTER-LIFE COMMUNICATION PLAN (2025-2030)

During the After-LIFE period (September 2025 – August 2030), the project beneficiaries will continue monitoring, communication and dissemination efforts, with the aim of extending the project's impact in terms of transfer, capacity building and long-term visibility.

As described in the sections below, this plan includes specific actions at local, regional, national and European levels, targeting the following groups:



ACTION 1

Continuation of monitoring of demonstration stands

Long-term monitoring of the 42 demonstration stands established during the project (Actions C2, C3, C4 and C5) will be continued. This monitoring will include, at a minimum, a new inventory of the treated plots and their selected control plots.

If necessary, stands for continued monitoring will be prioritised based on criteria such as representativeness of the silviculture applied, accessibility and interest for transfer and decision-making.

Concept	Action 1. Continuation of monitoring of demonstration stands
Responsible	UdL
Other participants	All
Estimated resources	63,000 €
Planned dates	September 2025-August 2030
Financing	Own resources
Target audience	Technical staff, Administration
Impact indicator	Number of inventoried plots

This action will contribute essential baseline information for future scientific papers, workshops and dissemination activities.



ACTION 2

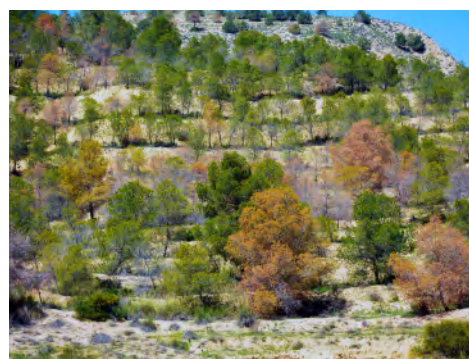
Maintenance and updating of the early-decay detection application

The project will continue maintaining and updating the viewer for early detection of Aleppo pine decline. The responsible beneficiary, AGRESTA, will update the suitability mapping and decay detection outputs annually, following the methodology developed during the project.

<https://lifeadaptaleppo.agrestaweb.org>



Concept	Action 2. Maintenance and updating of the early decay detection application
Responsible	AGRESTA
Other participants	All
Estimated resources	5,000 €
Planned dates	September 2026-August 2030
Financing	Own resources
Target audience	Technical staff, Administration, Forest ownership

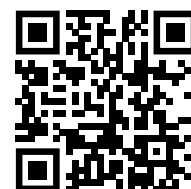


ACTION 3

Maintenance and updating of the implementation cost catalog

Ingeniería del Entorno Natural (IDEN) will annually review the cost catalogue to update prices related to personnel, machinery, materials and other resources. The catalogue will be kept updated both in its online version and in downloadable formats (BC3, PZH, Excel and PDF).

<https://adaptaleppo.eu/tablas-acciones/>



Concept	Action 3. Maintenance and updating of the implementation cost catalog
Responsible	IDEN
Other participants	All
Estimated resources	€3,000
Planned dates	September 2026-August 2030
Financing	Own resources
Target audience	Technical staff, Administration, Forest ownership



ACTION 4

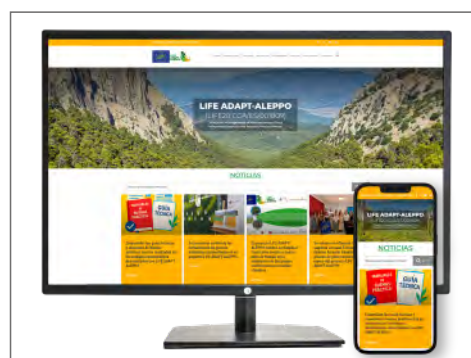
Website and social media maintenance

The project website will remain the main communication platform, and will continue to operate beyond the end of the project. The domain "adaptaleppo.eu" will remain active for at least five years. Key dissemination products and tools - such as the Cost Catalogue and Early-Warning Viewer - will be kept updated.

<https://adaptaleppo.eu/>



Concept	Action 4. Maintenance of the website and social networks
Responsible	IDEN
Other participants	All
Estimated resources	5,000 €
Planned dates	September 2025-August 2030
Financing	Own resources
Target audience	Technical staff, Administration, Forest ownership, Society.
Impact indicator	Number of unique website users. Number of social media posts. Number of new followers.



ACTION 5

Dissemination of project publications

All publications generated by the project will continue to be disseminated, particularly the **six technical guides**, which summarise the work methodology for implementing adaptive forest management:

- **Technical Guide on needs assessment for adaptive forest management**, focused on public administrations, it consists of a series of recommendations, based on assessments, on the needs to be applied to anticipate forestry in future forestry plans.
- **Guidelines for Climate Change Adaptation in Pinus halepensis Forests in the Mediterranean**, consisting of five specific guides:
 - Modelling and remote sensing techniques for adaptive management.
 - Implementation of assisted migration techniques in forest restoration.
 - Ecohydrology-based silviculture in Iberian Aleppo pine forests.
 - Structural and floristic diversification techniques.
 - Adaptive forestry techniques for post-fire regeneration.



Additionally, scientific papers currently under review – such as “Assessment of various assisted migration approaches to determine the highest performance in *Pinus halepensis* seed sources” – will be disseminated once published.

Concept	Action 5. Dissemination of project publications
Responsible	IDEN
Other participants	All
Estimated resources	5,000 €
Planned dates	September 2025-August 2030
Financing	Own resources.
Target audience	Technical staff, Administration, Forest ownership, Society.
Impact indicator	Number of downloads of each product in electronic format in the after-LIFE period. Number of exhibitions held and attendees.

Main dissemination channels:

- Project website and beneficiaries' websites: <https://adaptaleppo.eu/>
- Social networks of all partners.
- Presentations at conferences, training events and seminars.
- Networking activities with other projects.
- Travelling exhibition (at least 5 additional venues).

ACTION 6

Publications, participation in technical-scientific seminars

The final results of the project, as well as new outcomes generated in the Post-LIFE period, will be disseminated through technical and scientific publications and conference presentations.

Concept	Action 6. Publications, participation in technical-scientific seminars
Responsible	UPV
Other participants	All
Estimated resources	15,000 €
Planned dates	September 2025-August 2030
Financing	Own resources.
Target audience	Technical staff, Administration, Forest property, Society.
Impact indicator	Number of published papers. Number of communications made at conferences.

- Two scientific papers.
- Two technical papers on forest management and post-LIFE monitoring results.
- Two presentations at national or international conferences (e.g., Spanish Forestry Congress, Mediterranean Forest Week, or LIFE events).

These communications are expected to be developed by the Universities (UPV, UdL and UCLM) and will be led primarily by UPV.



ACTION 7

Training and capacity building activities

Concepto	Action 7. Training and capacity building activities
Responsible	UCLM
Other participants	All
Estimated resources	8,000 €
Planned dates	September 2025-August 2030
Financing	Own resources.
Target audience	Technical staff, Administration, Forest ownership, Society.
Impact indicator	Number of trainings and participants. Number of workshops.

To maximise the transfer of adaptive management practices, field-based training will be prioritised:

- One annual training session for university students (UPV, UCLM, UdL).
- One workshop for government technical staff.
- Two field demonstrations updating results after new monitoring cycles.

ACTION 8

Replication of Adapt-Aleppo actions

Concept	Action 8. Replication of Adapt-Aleppo actions
Responsible	IDEN
Other participants	All
Estimated resources	10,000 €
Planned dates	September 2025-August 2030
Financing	Own Funds of different Administrations and EU Funds (EAFRD, etc.).
Target audience	Technical staff, Administration, Forest property.
Impact indicator	Number of replicated stands. Area replicated. Number of forests and municipalities where it has been replicated.

The forestry interventions implemented in the Adapt-Aleppo demonstration stands are considered a first step toward making them increasingly resilient to the impacts of climate change.

Technical assistance will support entities wishing to apply the methodologies in new areas, aiming to replicate at least 1,800 additional hectares.

IDEN will lead this action, with DGMN playing a key role in public forests, and universities supporting transfer to other administrations.

The universities will also continue to transfer resources to other administrations that have participated in the project (Barcelona Provincial Council, Aragon Government, Valencian Government, Catalan Government, Castilla-La Mancha Regional Government, etc.) to ensure the replicability of Adapt-Aleppo's initiatives in the forests they manage.



ACTION 9

Media appearance

Concept	Action 9. Appearance in the media
Responsible	DGMN
Other participants	All
Estimated resources	3,000 €
Planned dates	September 2025-August 2030
Financing	Own resources.
Target audience	Technical staff, Administration, Forest ownership, Society.
Impact indicator	Number of press releases. Number of media appearances.

At least **three press releases** and **three appearances** in local, regional or national media are foreseen.



ACTION 10

Monitoring the adoption of policy and regulatory tools related to the project

The project will promote improvements in regional forest, climate and environmental policy to facilitate adaptive forest management. Expected follow-up includes:

Concept	Action 10. Monitoring the adoption of policy and regulatory tools related to the project
Responsible	DGMN
Other participants	All
Estimated resources	3,000 €
Planned dates	September 2025-August 2030
Financing	Own resources.
Target audience	Technical staff, Administration, Forest ownership, Society.
Impact indicator	Number of expert meetings. Improved models or regulations including Adapt-Aleppo principles.

Work with regional authorities to promote adjustments to the regulatory framework that facilitate the implementation of adaptive forest management, as has been done in the Region of Murcia

- **Murcia Region's Drought and Climate Change Action Plan:** has incorporated the LIFE Adapt - Aleppo project as a model for action , proposing the replication of its demonstration actions.

Main national regulations to follow::

- **Climate Change and Energy Transition Law (2021):** Articles on climate change adaptation and forests as carbon sinks.
- **National Strategy for Sustainable Forest Management:** Guide for adaptive forest planning.
- **National Climate Change Adaptation Plan (PNACC):** Identifies actions and objectives in forests in response to droughts and fires.
- **Spanish Forestry Plan (under review):** Key instrument of state forestry policy.
- **Regulations related to forest certification (PEFC, FSC).**





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