ASES ON-CHAIN PROTOCOL

PROPOSED PROJECT ACTIVITY ALIGNMENT ASSESSMENT

Ecological Restoration in Santa Clara a Velha, Odemira (Portugal)
LT-003-POR-062023 LUZIANES-GARE, PORTUGAL
Forest management
Modality B

May 24, 2024

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ALIGNMENT ASSESSMENT FOR THE PROJECT SUBMITTED BY LIFE TERRA, "ECOLOGICAL RESTORATION IN SANTA CLARA A VELHA, ODEMIRA (PORTUGAL)", WITH AOCP IDENTIFIER LT-003-POR-062023 LUZIANES-GARE, PORTUGAL.

CONTEXT

As part of the process for the certification of nature-positive projects and the consequent issuance of Verified Nature-Positive Credits (VNPCs) under the ASES on-chain protocol, the Project developer "Life Terra" submitted the project "Ecological Restoration in Santa Clara a Velha, Odemira (Portugal)", This Project activity is in the onboarding stage with the aOPC identification code LT-003-POR-062023 LUZIANES-GARE, PORTUGAL. It is a Forest management project in Santa Clara a Velha, Portugal, and project activities were implemented between December 9th, 2022 and December 31st, 2022. Compliance with the principles, values, standards, and requirements of the aOCP is a fundamental requirement to participate in the program. This evaluation takes place during the onboarding phase, before the registration of the project activities, as stipulated in the aOCP Procedures document, which describes all the stages that a Project goes through from its inception to the issuance, sale, and purchase.

Since Project activities have been implemented before the start of the onboarding process, it participates as a project of Modality B. According to the *aOCP Procedures* document, Modality B projects shall go through the following process to be registered:

1. Application via the Project Submission Form (PSF), done by the Project proponent.
2. Documentation review and alignment assessment, done by aOCP Operations Team.
3. Payment of onboarding fee by the project proponent.
4. Project pre-registration, done by aOCP Operations Team.
5. On-site Validation of the implemented Project activities, done by aOCP Operations Team.
6. Elaboration of Baseline report, Monitoring plan, and Contingent table of credits issuance, done by aOCP Operations Team.
7. Project proponent agreement.
8. Project Verification by an external, independent, 3rd-party Verifier, delivering a Project Verification Report.
9. Project registration letter and first credits issuance, done by aOCP Operations Team.

This report corresponds to step 2, alignment assessment. The methodology and data gathered on-site are presented here.

ALIGNMENT ASSESSMENT

The aOCP is founded on robust principles aimed at ensuring that Project activities seeking registration and accreditation with Verified Nature Positive Credits (VNPCs) demonstrably and positively impact ecosystems in a real, measurable, permanent, and additional manner while avoiding any harm to ecosystems and/or society.

Conformity with the aOCP's principles, values, rules, and requirements is a fundamental prerequisite for participation in the program. This evaluation occurs during the onboarding phase, before the registration of Project activities. This mandate is stipulated in the *aOCP Procedures* document, which outlines all the stages a Project undergoes from its inception to the issuance, trading, and retirement of VNPCs.

A positive result of the alignment assessment with aOCP's principles, values, rules, and requirements confirms that the proposed Project activity:

1. Falls into one of the following project types:
    a. Forest management, including Afforestation, Reforestation, and Revegetation (ARR)
    b. Regenerative agriculture
    c. Silvopastoral management
    d. Urban forests / individual tree climate action
    e. Biochar
2. Adheres to the environmental and social no-harm prerequisites,
3. Is anticipated to yield positive impacts on biodiversity,
4. The Project was developed less than 5 years ago;
5. Conforms to the additionality criteria for the requested VNPCs,
6. Possesses documentation substantiating land ownership or an agreement for the project's duration,
7. The Project area has not been degraded, deforested or burned in the last 24 months;
8. For Projects requesting *Biodiversity Credits for Species Conservation,* a positive alignment assessment also confirms that the proposed Project area has a high conservation value due to its commendable state of preservation.
9. Areas where the Mean Species Abundance indicator (also reported as Biodiversity intactness) is lower than 0.80, indicating that biodiversity is at risk and requires restoration action are eligible for Biodiversity restoration credits.
10. The Key species for biodiversity conservation reported by the Project proponent, are recognized as Key species according to the criteria established in the *aOCP Methodology for biodiversity assessment for species conservation V1.0*.

Certain circumstances may result in an unfavorable assessment and, if not rectified or clarified satisfactorily, could lead to the rejection of the Project activity's registration within the aOCP.

These circumstances include:

- Non-compliance with aOCP's principles, values, rules, and requirements,
- Issuance of contradictory and/or false declarations by the Project proponent or Project developer,
- Diminished confidence in the Project activity's ability to yield anticipated ecosystem and/or social benefits due to an inadequate risk management plan, which encompasses a comprehensive assessment of internal, external, and natural risks, as well as risk mitigation and contingency planning.

The proposed Project activity belongs to the aOCP category of *Forest management* and consisted of the ecological restoration of 5 different plots in a forested area in Santa Clara a Velha, Odemira, Portugal (Figure 1). Project activities involve the planting of 27,750 trees from 7 species native to the region and adapted to the local conditions. The planting was executed between 9/12/2022 and 31/12/2022.

The Project area used for the present analysis is shown in Figure 1.

Figure 1. Project area composed of four polygons used for the NDVI analysis.

METHOD OF ANALYSIS

The proposed Project activity was assessed for its alignment with the aOCP rules and requirements, using the following checklist.

Alignment criteria	Y: yes N: no P: partially N.A.: not applicable	Comments
Does the project belong to one of the following types: • Forest management, including ARR • Regenerative agriculture • Silvopastoral management • Urban forests / individual climate action • Biochar	**Y**	
Does the project comply with the environmental and social no-harm requirement?	**Y**	
Is the project expected to have positive impacts on biodiversity?	**Y**	
If the project has already started, is it less than 5 years old?	**Y**	
Do the requested VNPCs comply with the additionality criteria?	**Y**	
Has documentation establishing land ownership or an agreement for the project's duration been provided?	**Y**	
Have any trees or shrubs been cleared in the project area in the last 2 years?	**Y**	**Project developer provided adequate justification.**
For biodiversity conservation credits, Biodiversity intactness indicator is > 80%	**Y**	**Biodiversity intactness as of 2020 is 87.00%**
For biodiversity restoration credits, Biodiversity intactness indicator is < 80%	**N**	
Are the proposed key species aligned with the aOCP criteria for key species?	**Y**	

Historical land cover dynamics was analyzed using Google Earth high-resolution images as well as NDVI (Normalized Difference Vegetation Index) analysis. The NDVI is a widely used remote sensing metric that provides information about the density and health of vegetation in a specific area. It is calculated from the difference between near-infrared and red light reflectance from the Earth's surface.

When analyzing historic land cover, NDVI can be used to track changes in vegetation over time. By examining archived NDVI data, it is possible to observe trends in vegetation density, identify shifts in land use patterns, and monitor the effects of factors like urbanization, deforestation, or natural disasters.

NDVI provides information on the quantity and quality of vegetation in a given area. It varies from -1 to +1, where values closer to +1 indicate dense and healthy vegetation, while values close to -1 suggest a lack of vegetation or presence of artificial surfaces.

In Google Earth Engine, the maximum monthly NDVI from January 2019 to September 2023 was calculated using Sentinel-2 satellite imagery. Random control points were then plotted in each property and the monthly NDVI value at each point was extracted.

Google Colab was used to generate a box plot showing the distribution of NDVI values at the control points. A box plot is a standardized way of displaying the distribution of a data set based on its summary of five numbers of data points: the "minimum", the first quartile [Q1], the median, the third quartile [Q3], and the "maximum". Box plots provide information

on outliers, symmetry of the data, degree of clustering, and whether and how the data are skewed[1].

Biodiversity intactness quantifies the impact humans have had on the intactness of species communities. Anthropogenic pressures such as land use conversion cause dramatic changes to the composition of species communities and this layer illustrates these changes by focusing on the impact of forest change on biodiversity intactness[2]. This information was assessed via the Orbify platform.

RESULTS

The assessment of Google Earth images (Figure 2) shows that Polygon 1 of the Project area has been subject to extensive vegetation cover loss between March 2021 and January 2023.

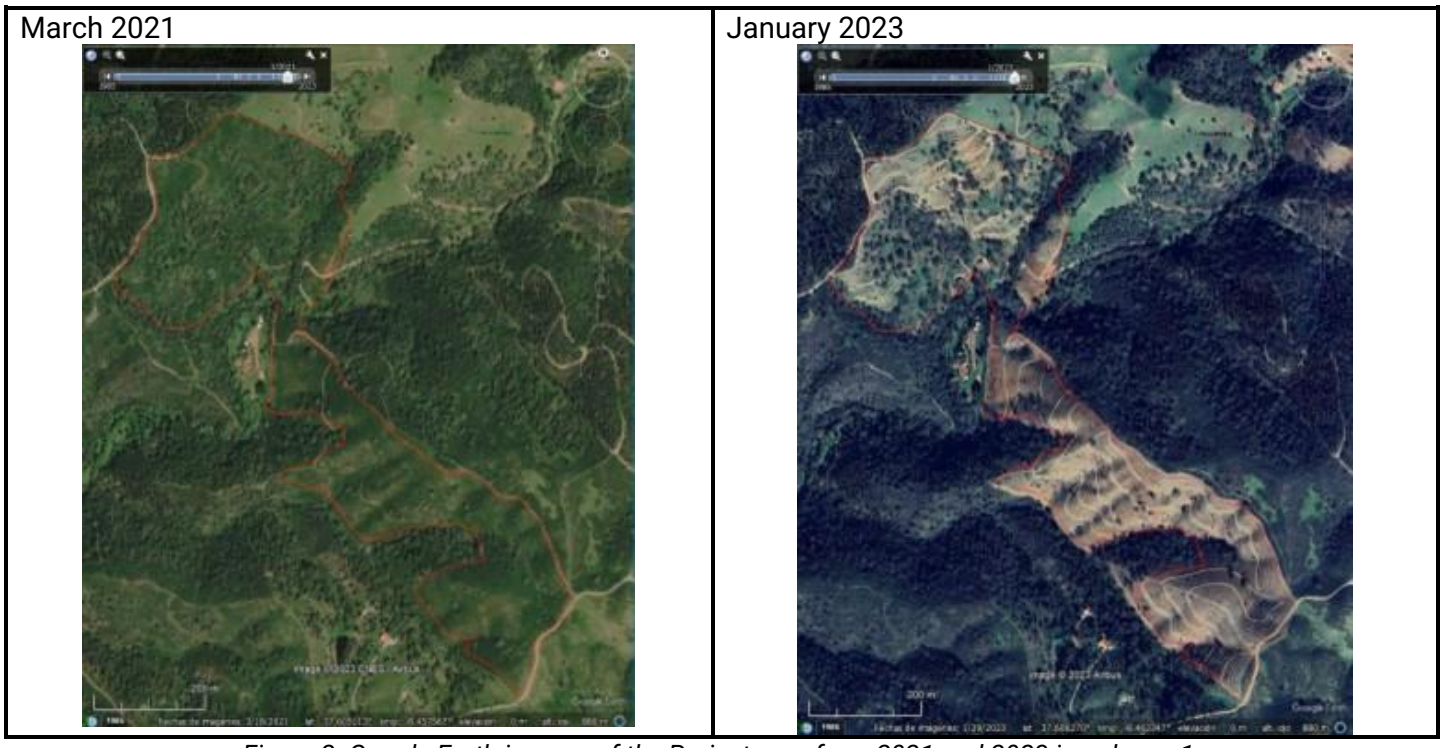

Figure 2. Google Earth images of the Project area from 2021 and 2023 in polygon 1.

[1] Galarnyk, M. Understanding Boxplots. https://builtin.com/data-science/boxplot

[2] Hill, S. L., Arnell, A., Maney, C., Butchart, S. H., Hilton-Taylor, C., Ciciarelli, C., ... & Burgess, N. D. (2019). Measuring forest biodiversity status and changes globally. Frontiers in Forests and Global Change, 2, 70.

Figure 3. Sentinel-2 images from different dates from 2021 and 2023 in polygons 2, 3 and 4

The monthly analysis of NDVI and rainfall is shown in Figure 4. The Normalized Difference Vegetation Index (NDVI) data spans from January 2019 to September 2023, revealing notable trends and fluctuations. Initially, from January 2019 to December 2021, the average NDVI remained stable and slightly increased to 0.64, however, beginning in January 2022, the average NDVI began to decline. By September 2023, the average NDVI was 0.35, indicating unhealthy vegetation and/or clearing of vegetation from the project area. According to the project developer, a deforestation event took place in September 2022 as the plot was suffering from the effects of the spread of the invasive species *Eucalyptus spp*., which had caused a reduction in biodiversity due to the displacement of native vegetation and soil degradation. *Eucalyptus spp*. is an allelopathic species, which means that it does not allow the proper development of other plant species, compromising ecological diversity, among other problems. Following the removal of the eucalyptus, the highest amount of trees were planted in areas where vegetation was absent (Figures 2 and 3), per the site's restoration needs, as well as on the northwest and southwest borders of the Project area. The implemented Project activities are, therefore, an important contribution to increasing forest cover in the Project area, while at the same time providing important economic and social benefits to the local community.

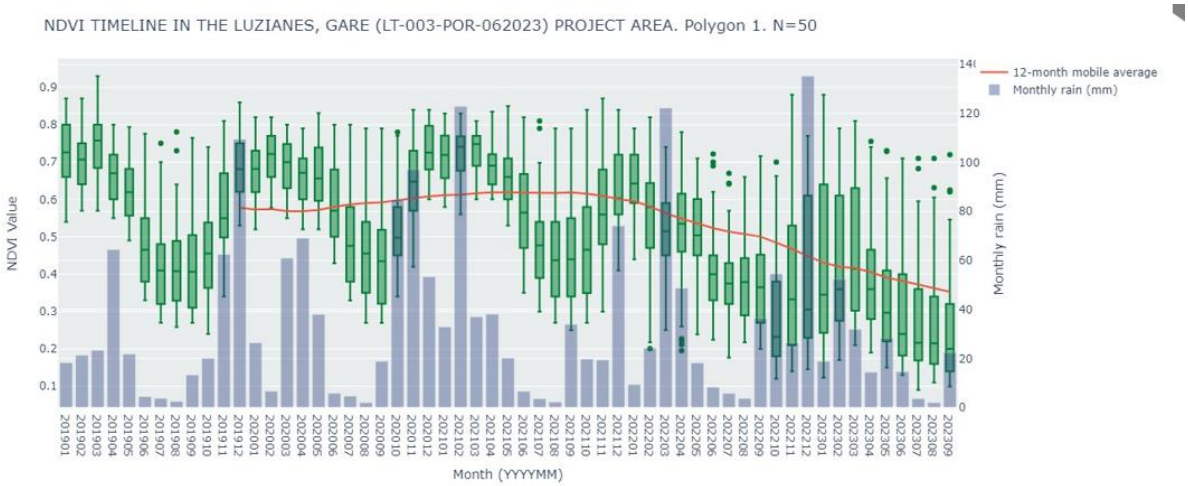

Figure 4. Monthly NDVI and rainfall in Polygon 1 since January 2019.

Biodiversity intactness has remained stable at 87.00% between 2017 and 2020 (Figure 4). This value is compatible with the biodiversity conservation objectives; however, this analysis precedes the project timeline. More detailed information on the ecological status of the project area and its risks can be consulted in the *Preliminary assessment* document.

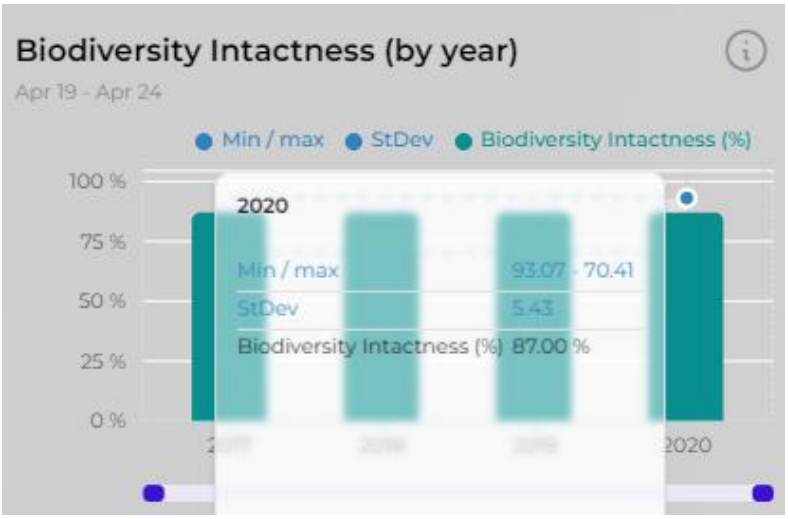

Figure 5. Biodiversity intactness.

The project focuses on the conservation of crucial endemic species and their habitats, giving priority to the preservation of biodiversity. This prolonged effort aims to catalog meticulously and understand ecological dynamics, providing valuable data for strategies-informed conservation policies and management practices aimed at safeguarding the delicate balance of ecosystems. Therefore, the planned activities of the project represent an important step towards forestry and biodiversity management in the area of the project, while bringing crucial environmental benefits to the local community.

Some of the species are considered key because they are endemic or in some category of risk, and their potential distribution according to bibliographic information covers the project area, these are presented in Table 1. However, the proponent must present the complete list of species inventoried in the project area and the corresponding evidence (photographs with camera traps, sensors, etc.) as established by the aOCP Methodology for biodiversity assessment for species conservation V1.0. in section III.2.1. Recompilation of data will be done, with which the aOCP team of technical experts will determine the species applicable to be considered "key" based on the criteria of the standard.

Table 1. Key species with potential distribution

Class	Scientific name	Common name	National Status	World status	Distribution Portugal
Fauna					
Aves	*Pandion haliaetus*	Osprey	CR	CR	Native
Aves	*Circaetus gallicus*	Short-toed Snake-Eagle	NT	NT	
Mammalia	*Rhinolophus hipposideros*	Lesser Horseshoe Bat		NT	
Reptilia	*Mauremys leprosa*	Mediterranean Turtle	LC	VU	Native
Actinopterygii	*Cyprinus carpio*	European Carp		VU	
Mammalia	*Lutra lutra*	Eurasian Otter	LC	NT	Native
Aves	*Curruca undata*	Dartford Warbler	LC	NT	
Amphibia	*Discoglossus galganoi*	Iberian Painted Frog	NT	LC	Native
Flora					
Liliopsida	*Anacamptis morio*	Green-winged Orchid		NT	

Global status IUCN Red List: (CO) Collapsed, (CR) Critically Endangered, (EN) Endangered, (VU) Vulnerable, (NT) Near Threatened, (LC) Least Concern, (DD) Data Deficient, (NE) Not Evaluated.

CONCLUSIONS

- The Project area has a biodiversity intactness of 87.00%, which is aligned with biodiversity conservation objectives.
- The potential distribution of at least 8 species of fauna and 1 species of flora, in some category of risk and/or endemic, highlights the importance of biodiversity conservation activities in the project area.
- The Project activities have not caused net harm to ecosystems or society, on the contrary, they are expected to create ecological, social, and economic benefits, thus driving sustainable development.
- In addition to positively impacting biodiversity, the project is expected to increase carbon dioxide removal and sequestration by enhancing vegetation cover, as well as safeguarding the soil from erosion and sustaining rainfall water infiltration.
- The aOCP rules and requirements establish that at least 5 plant species should be included to further enhance biodiversity. The planting of 7 different species native to the region meets this requirement.
- The project implementation was completed in December 2022, which meets the requirement of projects not more than 5 years old at the time this alignment assessment is carried out.
- The Project area experienced deforestation and soil degradation within the 12 months preceding the commencement of Project activities, in contravention of aOCP rules and requirements. This situation hindered complete adherence to the ASES on-chain protocol, however, the project proponent provided the requested information on February 28, 2024, in the document "Land use change in the project Ecological Restoration in Santa Clara a Velha, Odemira (Portugal)" (attached to this report). In this document, the proponent described the ecological situation of the project area before the restoration activities, as the plot was suffering from the effects of the spread of the invasive species *Eucalyptus spp.* This explanation was deemed adequate for justifying the project registration.
- Having assessed all these criteria for the aOCP Modality B project alignment criteria, this project “Ecological Restoration in Santa Clara a Velha, Odemira (Portugal),” with key identifier LT-003-POR-062023 LUZIANES-GARE, PORTUGAL is deemed eligible to be registered as a Modality B, Forest management project and can proceed unto the next steps of assessment for VCCs and VBBCs.

Land use change in the project Ecological Restoration in Santa Clara a Velha, Odemira (Portugal)

This document aims to explain and justify the land use change that happened in the plot owned by Antonio Carriço in Santa Clara a Velhah, Odemira (Portugal), with code LT003-POR-062023 for certification purposes.

Previous to the ecological restoration efforts, this plot suffered from the effects of the spreading of invasive species, more concretely *Eucalyptus spp*. The widespread establishment of *Eucalyptus* plantations for the commercial production of fiber and timber products has generated worldwide controversy for a few decades (Zhao et al., 2007). *Eucalyptus* plantations are easily established and fast-growing, and can be highly profitable, even in areas that are traditionally poor in soil fertility and timber production. However, there are also negative environmental impacts in planting *Eucalyptus*, such as loss of biodiversity due to displacement of native vegetation, and soil degradation (Bone et al., 1997, Forrester et al., 2006, Gareca et al., 2007). Furthermore, the manufacture of goods derived from Eucalyptus also hurt cultural values, as traditional forestry-related materials and jobs were displaced.

The presence of this species presented the following problems:

1. *Eucalyptus spp.* is an allelopathic species with negative effects. This means that this tree species produces chemicals that don't allow for the correct development of other plant species. The fallen leaves and branches on the topsoil liberate substances that produce abnormal growth of seedlings and/or the inhibition of seed germination.

2. Given the semi-arid conditions of this Portuguese region, the above-mentioned point entails an accumulative problem: making the soil more exposed and therefore more vulnerable to wind and water erosion. These processes contribute to the loss of vital ecological functions such as the fixation of organic carbon in the soil, the fertility of soils to support life, the nutrient reservoir, the infiltration of water, and the creation of habitat for edaphic fauna and microbiota.

3. Due to the above-mentioned problematics, there is a direct loss of native plant species and therefore, on biodiversity values. Traditional and historic species such as *Arbutus unedo* or *Quercus suber* have been displaced and can now only be seen in small forest patches. The economic activities that depended on some of these species (such as cork production) have diminished, provoking a decline in cultural values. The local fauna has evolved in this area to face the possibilities that this vegetation provides, and therefore can and has suffered a decline due to the loss of their natural habitat. Furthermore, this area is home to the second most endangered feline species on the planet, the Iberian Lynx (*Lynx pardinus*), which has seen its population decimated by the loss and fragmentation of habitat.

4. Monocultures not only exhaust the environment's resources and soil fertility but are also less resilient to external perturbations. Wildfires and pests proliferate more easily in

forests with a high percentage of one dominant species. This is a well-known problem in Portugal, where action plans have been developed for a few decades to prevent this (QUINTA-NOVA, L.C. 2022).

5. The exploitation of *Eucalyptus*-derived products has declined due to the monopoly or oligarchy of certain companies that dominate the market. This led to a situation in which the impoverished local people could not exploit their terrains either due to the low profitability of small exploitations or due to the high cost of removing these trees to promote other economic activities. When possible, the high cost of recovering the fertility of soils made it difficult to run profitable exploitations.

Because of this reason, in the project run by Life Terra, the landowner and the Foundation decided to enhance the resilience of the terrain by transforming it into a more sustainable forestry exploitation, giving priority to native productive species such as *Arbutus unedo, Pinus pinea, Prunus dulcis, Olea europaea, Ficus carica* or *Ceratonia siliqua*. For this vegetation to settle, it was decided to remove the *Eucalyptus* individuals and to scarify the terrain to get rid of other pioneer species such as *Cistus ladanifer.* The reason behind this relies on the fact that this will help the new vegetation settle, enhancing biodiversity and providing a boost to other ecosystem services. Also, the scarification of the terrain helps to break the impermeable barrier created in the topsoil to enhance water infiltration.

Moreover, once the vegetation is settled, between the planted lines (distanced 2-5m depending on the slope) natural regeneration could occur, giving again space for native species such as *Cistus ladanifer, Quercus suber* or *Quercus ilex*. *Eucalyptus* individuals can still emerge as the seeds are highly resistant and there are still individuals in the surrounding areas. It has been reported that mixed plantations of *Eucalyptus* and other tree species enhance biodiversity and productivity (Forrester et al., 2006), and given that this is a highly resistant species, in Life Terra it was decided to promote those that have lost their ecological niche.

The goal, therefore, was to recover the land from an invasive species while enhancing biodiversity, recovering soils, and providing a source of income for the landowner in the upcoming years.

In Life Terra we believe that we need to plant the right tree in the right place, and for that to happen sometimes a particular invasive species needs to be removed, either entirely or partially.

Signed at Barcelona, on 28 of February of 2024.

BY **STICHTING LIFE TERRA**

Sven Kallen

(Secretary and Founder)