Action D.5: Conclusions and recommendations

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1. Brief

Life Nieblas is a Life Programme financed project provided by the European Commission that support projects involved in climate action, natural habitat restoration and sustainable development. In addition to the European financing, Life Nieblas counts with the financial support from Cabildo de Gran Canaria as the public administration where this project has being developed.

Life Nieblas is a pioneer case study on the use of fog water collection as main source of water supply for the irrigation and maintenance of reforested areas. Reforestation methods will take shape of different technologies that have been observed to be beneficial or that have the potential to be further developed including: Individual Fog Water Collectors, Cocoons (developed in another Life project 'The Green Link'), AFDS (Autonomous Fluid Discharge System) and finally traditional reforestation as control group.

Furthermore, Life Nieblas looks into the transferability and replication potential of the technology tested. Not only will the project focus on the reforestation aspect but also on Fog Water Collectors (FWC) technology as the main (and only) source of water. In this case, technology has been tested in labs to improve FWC design and efficiency, they will not only become easier to install and transport but also will collect more water by surface exposed.

The final objective of this project will be to adapt technology to be exported to different European regions (and out of the EU) where fog conditions have the potential to improve water availability and assist in natural habitat recovery. Eventually, finding its way into the agriculture sector where farmers can take advantage from collecting their own water. Henceforth, Life Nieblas will contribute in climate change mitigation action (by reduction of emissions), carbon capture (by natural habitat recovered) and with the development of sustainable technology.

2. Summary

The present report measures the execution and results of communication and dissemination of results actions as well as the implementation actions except for action C2, completing the evaluation of all the implementation actions of the project. Its detail structure will allow a concise follow up facilitating the transferability of results and lessons learned. The indicators proposed for Action D.5 provide a detailed breakdown of the actions carried out for each action that has been considered within the present report. Additionally each section provides an overview and summary for what each action entails. Nevertheless we encourage the reader to visit each technical report for a full detail description of the actions and works carried out during Life Nieblas 4 year project www.lifenieblas.com/documents.

3. Linked to Action C3 replications and transferability

Action C.3 of the Life Nieblas project aimed to foster the replication and transfer of innovative reforestation techniques beyond the environmental sector, extending into agriculture, energy, and water management. These sectors were identified as key beneficiaries of the project's climate-adaptive technologies. Throughout the project, these goals were not only met but surpassed. Successful field demonstrations of fog water collectors and reforestation systems led to official commitments by the Gran Canaria Council and CIM Viseu Dão Lafões (Portugal) to adopt these technologies in future strategies, as expanded upon in the Action E.4 report.

Life Nieblas supported this transfer through the distribution of reforestation tools—such as cocoons and i-FWCs—to third-party stakeholders, supplemented by open-source documentation, technical blueprints, and multilingual tutorial videos accessible via www.lifenieblas.com and the @lifenieblas YouTube channel. Both in-person and online training initiatives enabled broad participation, even from stakeholders with limited scientific backgrounds. Notable collaborators included Spain's Ministry of Defense, and international academic partners such as Sapienza University of Rome and the NGO Biflores from Cape Verde.

Replications were carried out in diverse geographic areas—Cape Verde, Italy, Catalunya, Chile, and several sites in the Canary Islands including Tenerife, La Gomera, Lanzarote and Gran Canaria (Osorio, and Fuente Fría sites). This demonstrates the flexibility and resilience of the technologies under different environmental conditions.

Table 1, below summarises the indicators proposed by Life Nieblas' to monitor replication actions.

Table 1 Summary of parameters used as indicator for action C.3

Indicator	Total nº
Number of equipments distributed linked to any of the innovative reforestation methodologies.	130 cocoons
Number of stakeholders to which project´s information has been distributed.	50
Number of stakeholders to which any of the equipment linked to the innovative reforestation methodologies has been distributed.	2
Number of assessments on the innovative reforestation methodologies.	12
Number of people who have participated on the face-to-face training.	50
Number of visualizations of the training videos.	3896
Number of entities, apart from the beneficiaries of the project, who have participated on the International Days.	37
Number of innovative reforestation methodologies replications on third parties plots.	6
Number of seedlings reforested on third parties plots with innovative reforestation methodologies.	660
Reforested surface on third parties plots with innovative reforestation methodologies.	12.4ha

4. Linked to Action C4 reforestation evaluation method and its conversion into an Open Web Tool

Action C.4 of the LIFE NIEBLAS offers a framework for assessing the effectiveness, cost-efficiency, and water-use performance of innovative planting systems. These evaluations were centralized within the LIFE NIEBLAS Open Web Tool, accessible at https://lifenieblas.com/open-webtool.

The methodologies evaluated include the Cocoon system, Individual Fog Water Collectors (IFWC), the Autonomous Fluid Discharge System (AFDS), and traditional planting techniques. The IFWC technique, in particular, emerged as a leading model of cost-efficiency and survival success. Its high survival rate—paired with moderate water consumption—resulted in the lowest cost per surviving tree among all evaluated methods. This is especially relevant for fog-affected regions, where the IFWC can serve as both a water-saving and climate-adaptive solution. In contrast, the traditional method, although initially more affordable to install, demonstrated the lowest survival rate, with less than half the efficiency of the IFWC. Consequently, its cost per surviving tree was the highest, thereby diminishing its viability in long-term sustainable reforestation planning.

This tool has not seen significant amounts of input yet which is thought to be linked to the lack of knowledge about this tool of the general public. Life Nieblas produced a User Manual which is available through the website. Partners have committed to further encourage the OWT use throughout the POST-Life phase.

Indicator	Total nº
Number of visits to the Open Web Tool in the project´s website.	Apprx 100
Number of registrations to make use of the Open Web Tool.	3 projects
Number of reforestation actions whose data had been introduced in the Open Web Tool.	3 projects

5. Linked to Action C5 Synergy creation between results and policies

This synergy-building action is aimed at extending the innovative reforestation and fog water collection methodologies of Life Nieblas beyond conventional environmental domains into broader socio-economic sectors.

The strategic aim of Action C.5 was to ensure that the pioneering systems designed under Life Nieblas would not only serve ecological restoration goals but also contribute to climate adaptation, improved resource management, and policy evolution. The primary focus was to demonstrate how fog water harvesting systems could help reduce climate impact, improve seedling survival rates, and optimize the use of water in reforestation, while also aligning with agriculture, energy, and water governance strategies.

The implementation process was structured into three phases:

Sector-specific assessment: Detailed information was developed for agriculture, energy, water, and forestry sectors, evaluating how the AFDS, IFWC, and Cocoon systems could improve cost-benefit ratios.

For example, in agriculture, the AFDS showed potential to cut maintenance costs in remote fruit plantations.

Stakeholder engagement sessions: Technical teams held extensive meetings and synergy events with experts and professional groups, providing implementation guidance and collecting feedback. Participants received catalogues with methodological summaries and proposals.

Recommendations and knowledge transfer: Based on stakeholder feedback, a comprehensive set of sectoral recommendations was prepared. These actionable insights not only informed local and regional integration efforts but also served as key examples during international dissemination events, including congresses and synergy events held in 2023 and 2024.

Through Action C.5, Life Nieblas has effectively demonstrated how its innovations can support sustainable development goals in multiple sectors. This has laid the foundation for lasting impact by embedding fog water collection and climate-smart restoration techniques into the strategic frameworks of public and private stakeholders.

Indicator	Total nº
Number of people who have participated in the synergy sessions.	180
Number of representatives of public administrations who have participated in the synergy sessions.	35
Number of NGO, associations or non-public entities linked to environmental, agrarian and water and energy management sectors and policies who have participated in the synergy sessions.	145
Number of direct or indirect incorporations to normative or legislative instruments of any of the project´s results.	See rationale above

6. Linked to action E1 Promotional and dissemination material

This action will focus in the dissemination of results to experts but also to the general public. Life Nieblas is making every effort to contact organisations of interest, participate in congresses, symposiums, talks, participation in media channels, etc. in order to reach a wider audience. This will not only raise awareness but attract a number of companies, organisations and individuals interested in the methodologies applied by Life Nieblas.

Indicator	Total nº
Number of visits to the project website	82105
Number of information boards produced and installed	3
Number of the technical manual distributed in paper and digital format	200
Number of Layman reports distributed in paper and digital format.	200

7. Linked to action E2 Information and awareness-raising

This summary highlights the execution and integration of Action E.2 “Information and Awareness-Raising” into Action D.5 of the Life Nieblas project. Action E.2 was implemented between 2021 and 2024. Its purpose was to disseminate the project’s results and methodologies to both specialized and general audiences. Over four years, this action strategically employed external communication, public engagement, and media outreach to elevate awareness and understanding of Life Nieblas.

The action was conducted in two complementary phases. The first focused on two distinct target groups: “General Public and Education Sector” and “Technical Staff and Political Sector.” To maximize reach and engagement, dissemination efforts in 2023 were outsourced to “Welcome to San Borondón” (WtSB), a professional agency specializing in cultural communication and awareness. Their involvement ensured strategic public participation, effective content delivery, and impactful community outreach. Through educational programs, workshops, and school collaborations, the project successfully reached younger generations and inspired environmental consciousness.

The second phase documented the direct involvement of the Life Nieblas team in events, conferences, symposiums, and awareness activities. From February 2021 to December 2024, the project team participated in or organized numerous events, including international congresses and technical sessions. These forums provided opportunities to share data, discuss results, and strengthen cross-sector collaboration. Additionally, social media became a crucial vehicle for visibility, with continuous updates on platforms like YouTube, Instagram, and Facebook, engaging both technical audiences and the wider public.

This action was closely connected to Action E.1, which supported these efforts through the development and distribution of promotional materials such as the Layman Report, technical manuals, and informative leaflets. Together, these actions reinforced the visibility, accessibility, and impact of the Life Nieblas project.

In conclusion, Action E.2 played a pivotal role in extending the project’s reach, creating a bridge between technical findings and public understanding.

Indicator	**Total nº**
Number of the project´s beneficiaries representatives who have participated on networking sessions	10
Number of people who had participated in sensitization and awareness-raising activities sorted by target audience	599 students 188 technicians & politicians
Number of anonymous surveys obtained	506
Number of views of the promotional material in digital format, sorted by target audience if possible.	6471 (only YouTube)

8. Linked to action E3 International Days on Climate Change, Reforestation and Fog Collection

GESPLAN and particularly Life Nieblas played a key role in the organisation assistance and participation of the First Ecoislas Forum (February 2023) by organising a 'main stage' stand focused on Life Nieblas but also assisting in the general organisation of the event (see figure 40). Ecoislas, which is promoted and financed by the Cabildo de Gran Canaria and organised by Infecar, Feria de Gran Canaria, is an international event designed to provide a space for discussion, proposals and promotion of measures aimed at promoting the transition towards a greener, more profitable, more self-sufficient and environmentally sustainable socio-economic model with a strong island focus. The event features international, national and local speakers who present best practices and discuss the needs and solutions provided to each of the four main blocks of this event: the circular and blue economy; energy, water and mobility; adaptation to climate change and biodiversity.

Indicator	Total nº
Number of projects and investigations exposed in the International Days on Climate Change, Reforestations and Fog Collection	24
Number of stands of companies, people or entities who displayed their products, technologies and services to the people registered in the International Days	9
Number of people who participated in the workshops	505
Number of entities represented by the people who participated in the workshops	47
Number of people who had visited the actuation area in Gran Canaria during the International Days	0
Number of people who had participated on the Networking sessions	84
Number of entities represented by the people who participated in the Networking sessions	20

9. Conclusions and Recommendations

In addition to the metrics recorded and analysed within this report, the reader in recommended to also download and read the Technical Manual which is available through our website www.lifenieblas.com where further insights and details about the implementation of replications are summarised.

9.1. Conclusions

- Considering the extremely dry conditions during the project years and the challenges that had to be faced, the results obtained from the testing of the innovative planting techniques are remarkably successful, significantly increasing survival rates
- Reduced water usage when applying innovative reforestation methods
- Although Cocoon system degrades faster in soils with high soil fauna activity, the higher survival rates and reduced water usage have yielded excellent results also in those environments

- Individual Fog Water Collectors (IFWC) that incorporate a capture net are the most successful method of reforestation due to its multifunctionality: light rain, dew and fog collection, evapotranpiration reduction and herbivores prevention
- IFWC is a reusable reforestation method which will see its carbon footprint reduced after every reimplementation in the field
- It was proved that the AFDS method and irrgation network are reusable which will see its carbon footprint reduced after every reimplementation in the field.
- Fog water collection could be a useful tool when considering water sourcing in isolated areas where fog is present, especially those under risk of desertification which may take advantage of foggy conditions
- In terms of the fog collection infrastructure installed, Life Nieblas has developed a structurally stable against wind gust, easily deployable and more efficient fog water collector: the innovative FWC (i-FWC)
- i-FWC yielded up to 3 times more fog water per collecting screen surface compared to the other two fog collectors tested at El Pinillo
- Fog collection is highly dependent in location as proven by other locations studied in Life Nieblas (Osorio and Fuente Fría, both in Gran Canaria)
- External stakeholders see a benefit in the replicability of this project as proven by several case studies currently under development
- Passive restoration is working well in El Pinillo and Vouzela, despite plantations and vegetation management is needed in order to guide it to the targeted habitats
- The experience obtained during the project execution and monitoring provides practical guidelines for future reforestation efforts

9.2. Recommendations

The experience and outcomes of the LIFE NIEBLAS project provide a rich set of recommendations for replication in other regions facing similar ecological and climatic challenges. Particularly in areas experiencing desertification, the implementation of innovative reforestation methods such as the Individual Fog Water Collectors (IFWC), Autonomous Fluid Discharge Systems (AFDS), and Cocoon systems has proven highly effective. IFWCs, in particular, have demonstrated exceptional multifunctionality by capturing fog, dew, and light rain, while also reducing evapotranspiration and protecting seedlings from herbivores. The reusability of IFWC and AFDS systems also presents significant long-term sustainability benefits, including a progressive reduction in carbon footprint with each field reimplementation. Additionally, the innovative fog water collector (i-FWC) developed through LIFE NIEBLAS exhibits notable advantages in terms of wind resistance, efficiency, and ease of deployment, supporting water sourcing in isolated, fog-prone areas. These Innovative Fog Water Collectors i-FWC yielded the highest fog water collection rates, with up to three times more water harvested per unit area than other fog collection technologies. Although the Cocoon system displayed a faster degradation rate in biologically active soils, its capacity to ensure seedling survival with reduced water use remains a strong asset. Replication initiatives should also consider the influence of local topography and microclimate on fog collection performance, as variations were observed across sites like El Pinillo, Osorio, and Fuente Fría. Passive restoration strategies, when complemented with vegetation

management and targeted planting, are also recommended for habitat recovery. The documented success and external stakeholder interest underscore the potential of replicating the LIFE NIEBLAS model in other dryland or mountainous regions. Finally, the practical insights gained from project execution and monitoring contribute to a set of field-proven guidelines that can inform effective design and adaptation of similar ecological restoration actions elsewhere.

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