



LIFE Project Number
LIFE14 NAT/PT/001081

Progress Report¹
Covering the project activities from 01/07/2019² to 31/09/2020

Reporting Date³
31/10/2020

LIFE PROJECT NAME or Acronym
LIFE LINES - Linear Infrastructure Networks with Ecological Solutions

Data Project

Project location:	Alentejo (Évora, Montemor-o-Novo, Arraiolos, Estremoz, Vendas Novas) - Portugal
Project start date:	01/08/2015
Project end date:	31/05/2021
Total budget:	5,540,485 €
EU contribution:	3,324,303€
(%) of eligible costs:	60%

Data Beneficiary

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¹ Progress Report without any payment request (for Progress Reports with payment request, use the Mid-term Report template)

² Project start date in the case of the first Progress Report, otherwise date since the last reporting period

³ Include the reporting date as foreseen in Form C2 of Annex II of the Grant Agreement or as modified in agreement with EASME

Section 1 - Overall assessment of the achievements and as to whether the project objectives and work plan are still viable (2 pages max)

The project has 35 **actions**: A1, A3, A4, A5, A6, C3, C7, C10 are concluded and goals achieved. E11, F4 have not start yet. Others are ongoing.

Regarding **preparatory actions**, A2 is predicted to go on collecting data until the end of the project. So far 95962 occurrence records of 228 different species were integrated into GIS database, of these 10904 between 1 July and 30 September 2020. There are 8 now entities and 8 investigators contributing with data, along with the data from app LIFE LINES. IP is producing an internal guide for fauna mitigation measures (A7), to help guide designers and constructors from IP and from companies working to IP. The terms of reference for future Road Maintenance Contracts (national scale) as well as the addition to the actual contracts (in several national roads of the project area), integrates already on-going better practices on vegetation management and invasive species control, as well as the fences with net in 'L' shape.

Regarding **conservation actions**, C1 is now concluded with the replacement of 30kms of existing fences at IP2 and implementation of a complementary net set in "L" format (concluded in august 2020). The possibility of fence reparation instead of replacement, although initially considered was not possible, due to the lack of good conditions of the fence and also to the way the actual net was supported in the wooden posts ("L" net has to be fixed on the outside). Another reason to replace the fence has to do with the location. IP usually implements the fences in the border of its territory. So, there was no space to bury 50 cm of net without entering private property. For this reason, the new fence has to be installed nearer the road at least 50 cm.

C2 plantations in the micro-reserves were reinforced in the autumn of 2019. After budgetary restructuring (under the project extension), IP will make an additional campaign of control invasive flora species in 53 additional plots (total of 6566m²) (Autumn 2020 and Spring 2021). Although C3 action is finished we are undergoing replacements of road signs that have been damaged or robbed (2 in EN114 and 1 in EN4). The mobile application to register fauna road kills events (C4) was made available to the public in Google Play in July 2019. It is fully functional with 700 registered users and 961 records. IP and UEVORA are working in improving the APP based on its use by our team and feedback from users. The installation of the 64 poles (pylons) frames along 13km of intervened lines (C5) ended by August 2020. Pre-intervention monitoring data (October 2018 to June 2020) found 73 dead birds from 19 species by collision or electrocution. The biodiverse seed mixtures sown in the in-situ plots (C6) are succeeding both on roadsides and ecotrails. The possibility to undertake a second monitoring period in the spring of 2020, following the extension of the project, allowed to confirm the resilience of the seed mixtures. Owl elevated flight barrier in EM529, the last construction work associated with C7, was finished only in September 2019 due to difficulties with public tender procedures. The action is now concluded and monitoring will occur until May 2021 by roadkill monitoring. Plantations in the micro-reserves were reinforced in the autumn of 2019 and although the action is now concluded more plantations are predicted for the autumn of 2020. C8 mitigation measures are concluded and plantations in the micro-reserves were reinforced in the autumn of 2019. An additional campaign of control of invasive exotic species was predicted for late summer/yearly autumn 2019 but due to the lack of companies interested in the call, only in August 2020 this campaign was possible to occur. This campaign in 22 plots along the ecotrail was implemented by the CMMN with the collaboration and supervision of the flora team of the UEVORA and MARCA. Monitoring its effects will occur in the spring of 2021. More plantations are predicted for the autumn of 2020 as a reinforcement due to normal plant

mortality. The nursery (C9) produced more than 8000 plants of 93 native species, and 28920 seeds, germinating or growing 8087 plants of 100 different species.

Regarding **Monitoring actions**, socio-economic indicators (D1) were updated until the 2nd trimester of 2020. We will make 3 remaining updates until the end of the project fulfilling the indicator (15 updates). We have performed a compilation of information concerning ecosystem services (D2). Most relevant services seem to be related to Regulation and Maintenance (landscape functional connectivity, Invasive Alien Control, Pest Control, Seed Dispersal) and Cultural (Recreation and community activities, Information and knowledge). D3 monitoring showed that the impact of the conservation measures for fauna mortality reduction proved to be efficient (e.g. amphibians up to 90%; owls 70%; passerines 50%). Flying vertebrate's barrier in N114 resulted in a decrease of mortality (roadkills/year before = 20,11; after = 11). Monitoring of the control methods of invasive flora species preliminary results show that cutting of *A. donax* produced an immediate reduction in the its cover, followed by a progressive recovery, though without reaching the initial extension and density; debarking showed the fastest results for acacia species. Monitoring of sown plots and micro-reserves plantations registered an increase in the diversity and richness of native flora species. Preliminary results of the monitoring of the biodiverse seed mixtures sown in 23 in-situ plots show the success and resilience of the seed mixtures. Preliminary results of the monitoring of the plots installed in the base of powerline poles suggest that the most beneficial management of poles is through fencing and sowing since this simultaneously increases the floristic richness and habitat and fauna refuge. Regarding prototypes, some data is still being analysed (e.g. New Mobile Mapping Trailer) but others showed promising results, like the Dissuasion device for large bird in the dissuasion of black kites for instance. Roadkill monitoring (MOVE – UEVORA) on a daily basis will end by 30 October 2021 because most of the conservation interventions will complete a two year monitoring at that date and will change to a weekly basis.

Regarding **dissemination actions**, the website (E1) has been updated 215 times, averaging 210 monthly users. Actions description and results were also updated in the website (July 2020). A field visit was made to record the status of the outdoors (E2) where we registered 48 medium-sized outdoors and 1 large outdoor on-site, in a good state, and 9 medium-sized outdoors damaged on-site or absent (stolen or previously collected due to damages). Project dissemination (E3) has been a priority (617 news). The collaboration with RNA (highest rated local radio) is ongoing again, after a break due to the pandemic situation (so far 63 weekly radio spots). 15 teasers, 1 tutorial and 11 thematic videos were produced (E4), and the Project documentary and other teasers are ongoing. Six master theses were concluded and 2 PhD theses are ongoing (E5). So far we did 6 workshops with 152 participants (E6): in 2020, in 9th January within the scope of the protocol with GNR we implemented the first workshop for GNR with 37 militaries "The importance of fauna roadkills for the conservation of biodiversity and road safety"; "Fauna roadkills records" within the scope of Ecology Day in 15th of September (participants stakeholders included Universities – Évora, Oporto, Trás-os-Montes e Alto-Douro, NGOs - Geoparque Arouca, Scientific associations - Sociedade Catalana de Herpetologia), "Control of invasive flora species in the LIFE LINES project" in 15th of October within the scope of the 1st National week on Invasive Species (stakeholders participants: UEvora, University of Oporto, Stiftung Naturschutz Berlin, ICNF – The Portuguese Authority for Nature Conservation, Investigation Centres – CCMAR - Centre of Marine Sciences, University of Algarve and Centro de Investigaci3es Científicas Avanzadas, Universidade da Coruña., Architects, schools and Montemor-o-Novo Municipality). The workshops had 37 (in person), 14 and 16 participants (online) respectively. In relation with the guides, UEvora started to build contents for the one directed to the monitoring and register of roadkill fauna and the one of directed to the road projectionists, the second in collaboration with partner IP and are

predicted to be concluded until the end of this year. Due to this year format of the EU Green Week 2020 we weren't able to submit the presentations but two team members of the project attended and actively participated online to the EU Green Week 2020 (E7). Up to now, 135 volunteer activities have been carried out (E8) with 2942 participants. Of these 39 activities, including 242 participants were conducted since the last report. IENE Conference, which will include the LIFE LINES Final Seminar was postponed to January 2021 in virtual mode. Since June 2019, 8 activities were organized in E10 (e.g. Childrens Day, 800 people, Workshop "The quality of the Environment", 101 students).

Management actions (F) are proceeding with regular meetings (F1). The compilation of project indicators is regularly updated and available in the project site (F2).

In relation with **impact on Nature & Biodiversity** project main targets, global Biodiversity trends in the study area are increasing when comparing 2016 with 2020 (e.g. Amphibians: total abundance +146%, species richness 9 to 10). The total roadkills of mammals in the intervened culverts decrease after the interventions (16 to 13,5), with the nº of culverts crossings increasing for genet and stone marten after the placement of the fences. After sowing and planting in the microreserves under the power lines poles, there was an increase in the abundance of small mammals, of flora richness and abundance, and in butterflies (1048 individuals of 15 species including target species - *Melanargia ines*, *Thymelicus acteon* and *Vanessa cardui*). In the microreserve of N4, there was an increase from 9 to 18 species, 237 individuals, including target species *M. ines*, *M. lachesis*, *T. acteon* and *T. lineola*. There was a significant reduction in the nº of roadkilled amphibians in the intervention sites (e.g. EM535, 2018 from 22.5% to 100%, 2019 from 60.7% to 99.6%; EM529 - 74.9% in 2018, 100% in 2019). In the ecotrails, 10 endemic flora species were promoted (2 only present in the seed mixture developed); habitat for 10 target and 1 non-target butterfly species was favoured. *A. donax* control has been partially successful and an increase in the richness and diversity of native species has been registered at these locations. We are still implementing invasive campaigns to support these results.

Regarding replication and indirect impacts of the project, some local authorities are project partners directly involved in the implementation of conservation actions. The awareness about the importance of controlling invasive species, despite the difficulties associated with its implementation, was probably one of matters for which project contributed the most, with local/regional (Municipalities, Alentejo Regional Development and Coordination Commission) and national authorities (ICNF) participating on meetings. The main medium powerline operator in Portugal (EDP distribuição) is willing to generalize the use of the ECO-HAL, the new pole frame aimed to reduce bird collisions and electrocution in powerlines, both in Portugal and abroad. C10 contributed to a higher involvement of REN (the main very high tension powerlines operator in Portugal) in projects aiming to potentiate the use of vegetation under powerlines as biodiversity refuges and connectivity corridors. IP is ready to replicate across the country the adaptations of drainage passages with dry ledges to reduce hotspots of wildlife roadkills. Regarding policy implications, a new traffic signal alerting for a possibly high number of amphibians crossing the roads and roadkill risk was officially approved and is now part of the National "road code". Additionally, in the sequence of the 2017 fires, new legislation (DL20/2018) requires to cut vegetation on roads to reduce fire ignition risk. The project was able to negotiate exceptions at the Municipality level commissions for important conservation areas. Also at a policy level, the final LIFE LINES seminar will be integrated into the International Conference of the "Infrastructure and Ecology Network Europe" where most worldwide linear infrastructure researchers, technicians, and managers will meet on an online event. A final declaration of the event concerning linear infrastructure management) will be approved on the event General Assembly and will spread among politicians and decision-makers at the country, European and worldwide level.

Section 2 - Identified deviations, problems and corrective actions taken in the period (max 2 pages)

Following what was discussed during the fourth monitoring visit to the project in June 2019, and what was reported in the 3rd Progress Report, we asked for a project extension until 31/05/2021. This was necessary to ensure adequate monitoring and completion of objectives foreseen in the Conservation Actions. From March to early May 2020 most of the on-going tasks had to be stopped due to the Covid-19 pandemic. This represented a delay in several actions, mostly related to fieldwork and with administrative processes.

C5 was delayed on a 1st moment due to the delay of the payment to the subcontracted company by Quercus and consequently to the halt of pole frame installation that was occurring in January, and in a 2nd moment due to the pandemic. Installation is completed now and post-intervention monitoring is occurring between August 2020 and January 2021. Monitoring effort will be more intense (by-monthly) than predicted (monthly) to acquire the most data possible. IENE 2020 Conference, which will include the LIFE LINES Final Seminar (E9), had to be postponed to January 2021 and to occur in virtual mode. Its organization is ongoing with the help of online platform services that will host the conference. Only one task remained to be implemented in C1, the “implementation of a complementary net set in “L” format stapled to the existing fences”. This task, that has started in April 2019, was not concluded due to several logistic and bureaucratic restrictions. IP has initiated a new tender process that only became public in November 2019 and signed in March 2020. IP expected to have this task concluded by May 2020 but due to the COVID-19 restrictions works ended in August 2020. Monitoring is being done (D3) by the IP Roadkill monitoring until the end of the project, but this monitoring will still go on during the post-life, since IP has integrated this procedure into their operational standards. The extension allowed to accomplish the invasive species control in the Montemor-o-Novo ecotrail (C8) that was scheduled in the 3rd progress report for autumn 2019 but was only implemented this summer (August and September 2020)

In the sequence of the 2017 fires, legislation (DL20/2018) reinforced the need to cut vegetation on roads to reduce fire ignition risk. This was a drawback for LIFE LINES actions aiming manage vegetation on those places to potentiate their role as corridors and biodiversity refuges. Consequently, regarding the new practices of vegetation management on verges, several meetings were conducted between beneficiaries on the best way to make compatible the conservation needs (minimize the impact of the current management practices on small fauna) and the new legislation (DL20/2018) on fire prevention. These resulted in the application whenever possible of vegetation management measures on verges. The project also produced a document with guidelines for managing roadsides for biodiversity valorisation under the scope of this legislation as a way to managers implement exceptions and adaptations of the legislation and requests for upholding these guidelines are ongoing (municipalities and nationwide). Municipalities of Montemor-o-Novo and Arraiolos authorized localized exceptions for particularly important intervention areas. In the Évora county in some roads was possible to leave uncut vegetation strips near the fence, as an experiment. IP has also started to request in the terms of reference for the environmental impact assessments of roads and railways, the identification of areas with invasive species, to guarantee its adequate control during and after the infrastructure construction. In the micro-reserves (C2, C7, C8), plantations showed a significant establishment success in the spring (the first monitoring period after autumn plantations), but the survival rate decreased in the monitoring periods after summer. In the plots installed in the base of powerline poles (C10), plantations showed significant success in the spring, but the survival rate decreased in the monitoring periods after summer (34% mortality in spring and 26% in summer). To account for these losses in both cases, plantations were reinforced in autumn 2019 and additional plantations are also predicted for autumn 2020.

Regarding the app (C4) the n° records/month expected in the proposal was 600, this was an overestimation not possible to obtain (presently 74/month), as proven with the fulfilment of the other indicator (10% of the total records of roadkill data must be from the app - since the start of the app we have 10,5%). In July 2020 a visit was made to assess the conservation status of the outdoors (E2). We recorded 9 medium-sized outdoors damaged on-site or absent (stolen or previously collected due to damages). As soon as possible, the replacement of damaged outdoors will be made. Questionnaires (D1) were applied to two ecotrail (Évora and Montemor-o-Novo) users revealed, among other, majority of respondents (56%) know the project but almost half were unaware of the existence of informative outdoors of the project. Consequently, were are planning on placing additional outdoors in more visible areas of the ecotrails.

Up until the Covid-19 pandemic (March 2020), the NIA (Environmental Interpretation Nucleus) was in operation. On 13/08/2020 it was vandalized. All the environmental education activity planned is suspended, despite the high demand from teachers and children. It is necessary to proceed with the acquisition of new material to support environmental education activities. In this sequence, we are exploring the possibility of using the surplus money from other types of expenses of CMMN budget for this acquisition. Some actions needed and will need until the end of the project for financial adjustments to better fulfil objectives. This will imply shifts between the type of expenses and since some beneficiaries will not to execute their full budget we are predicting the possibility of shift between beneficiaries budgets.

Regarding the **deliverables**, 11 of the 32 are completed. 20 with new deadlines with project extension but 15 are products related to the end of the project. From the last progress report “Paper(s) submitted about the works of Action C.6” was concluded (1/9/2019) and a research article titled “Seed germination of six Iberian endemic species – a contribution to enhancing plant conservation” has been submitted to a new journal and is now under final revisions for acceptance in Plant Biosystems. E10 “Mor Magazine - Edition about the program "Adopt a road" predicted for 31/05/2020 is delayed due to the Covid-19 and is predicted to be concluded until the end of the year.

52 of the 65 **milestones** are completed (13 have new deadlines with project extension). From the last progress report, two here completed: “Conclusion of the execution of works of the Action C.8” that was changed to 31/07/2020 in the extension request was finished in 30/09/2020; “Conclusion of the monitorization of the sowing in-situ tests”, concluded on 30/06/2020 as predicted in the extension request.

Regarding the 163 **Project Specific Indicators**, 43% were exceeded, 16% are achieved and 22% are still underachieved (19% are still not applicable - e.g. downloads of outputs still to be produced). Regarding **Key Project Indicators** most of them show an adequate trend. For example, the control of 28638m² of invasive plant species in project area, conducted by three partners (CME – 23422m² in ecotrail and EM529; CMMN – 17849m² in ecotrail; IP in national roads – 13638m²) is contributing to improving the overall ecosystem condition. In the future, as a replication action resulting from this project, the total area of intervention predicted is expected to be must larger, after the adoption of the good practices developed by IP. The web page has 75.550 views. Fifty-eight information boards have been installed, the broadcast in 13 national TV's programs as well as others forms to dissemination (radio n=68, printed and online journals n = 163, volunteer's actions, etc.) are increasingly contributing to higher public awareness. Concerning the socio-economy, the direct creation of at least 23 new full-time jobs during the project and spending and acquiring services from 114 local persons or firms, was been a great contribution for a peripheral depressed region. The full evaluation of the accomplishment of these indicators will only possible at the end of the project and for some (ecosystem trend and condition) after that. Despite this, ecosystem global trends in project indicators are positive.

Regarding the new **project schedule** defined in the project extension, we are not expecting for delays in actions/tasks, except for good practices guides (E6 deliverables) that need data from ongoing monitoring, namely from the devices for deterring bird landing in medium voltage power lines and data from invasive plant control that will lead to the finishing two of the guides in February 2021 and not in November 2020 as predicted. Additionally, the corresponding workshops (8 are predicted for demonstration of these practices – 3 are made) will be conducted in parallel with the guides since contexts are the same and some may go up to march 2021.