



LIFELINES

Linear Infrastructure Networks with Ecological Solutions



LIFE-LINES (LIFE14NAT/PT/001081)
Linear Infrastructure Networks
with Ecological Solutions



<https://lifelines.uevora.pt>

THE PROJECT

Thousands of animals die every year, roadkilled, hit by trains, or by colliding with medium and high voltage powerlines. The impact of these deaths undermines the conservation of biological diversity, but some solutions allow for mitigation of these effects. It was with this purpose that the **LIFE LINES Project** was born, coordinated by the University of Évora in partnership with the University of Aveiro, the Faculty of Sciences of the University of Porto, the Municipalities of Montemor-o-Novo and Évora, the Infrastructures of Portugal S.A., the Marca - Local Development Association and the Quercus - National Association for Nature Conservation. The LIFE - Nature and Biodiversity project focuses on promoting and recovering biodiversity in general, in an area that is still well preserved, but presents a series of linear infrastructures (roads, railways and medium and high voltage powerlines) that can jeopardize the state of populations.

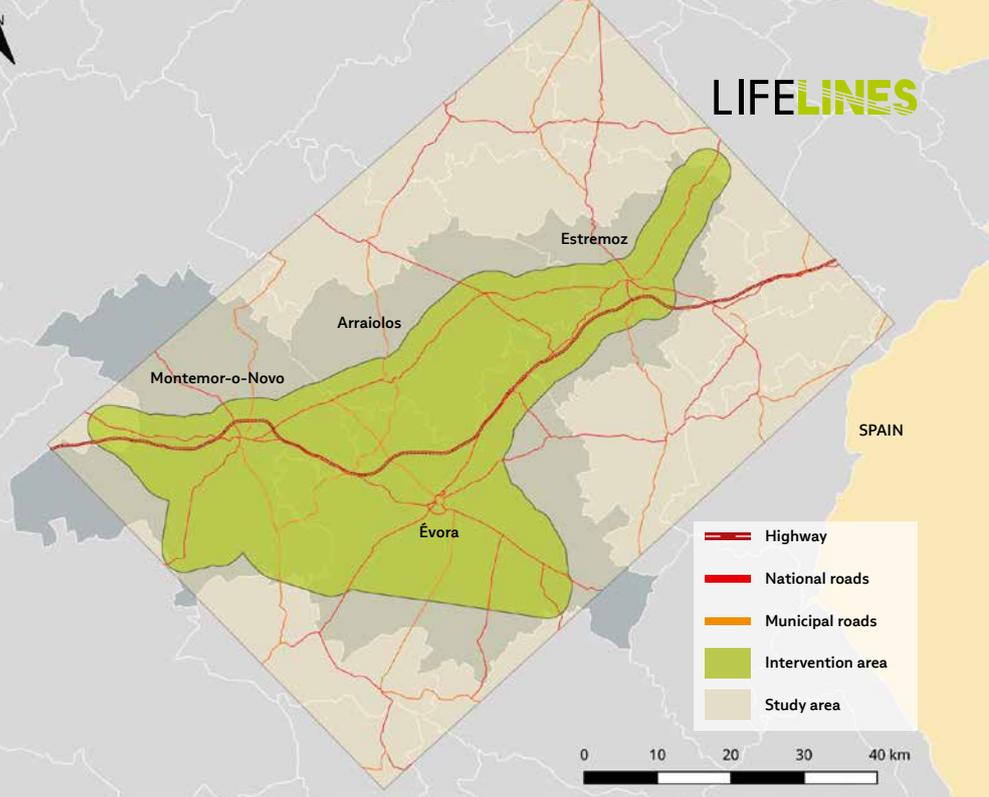
The **LIFE LINES Project** aims to contribute to the creation of a Green Infrastructure that promotes shelters for plants and animals, and their safe movement along the linear infrastructures ensuring ecosystem services and thus mitigating their negative impact on biodiversity.

Its **main goals** are:

- Promote landscape connectivity;
- Reduce wildlife mortality by electrocution, collision and roadkill;
- Create biodiversity corridors and refuges;
- Detect and control exotic and invasive vegetation;
- Implement a national roadkill fauna database;
- Promote the dissemination and replication of actions and results in other contexts of linear infrastructures;
- Inform and raise awareness of citizens to the impacts of linear infrastructures on biodiversity.



LIFELINES



This project started in 2015 and will end in 2021. It is located in Alentejo Central in an area crossed by the main land transportation corridor between Lisbon and Madrid, where there is a high concentration of highways and powerlines of energy transportation and distribution. The intervention area, with approximately 210 000 ha is located in the municipalities of Évora, Montemor-o-Novo, Estremoz, Arraiolos and, marginally, Vendas Novas and Monforte.

CONSERVATION ACTIONS

IMPLEMENTATION OF WILDLIFE PATHWAYS

Hydraulic passages (drainage culverts) are good places for wildlife to cross the road safely. However, during the rainy months, these passages can be flooded preventing its use. To allow them to be available for wildlife crossing all year long, pathways were implemented in the passages, in strategic locations that remain dry even during the rainy period.



PLACEMENT OF TIGHT MESH NET ON THE ROAD VERGES

The road verges are refuge areas for rabbits, which find in these places food and adequate soil for their shelters. However, they constitute mortality hotspots for the species, and their shelters compromise the stability of the road slopes.

To prevent the settlement of rabbits in road verges, tight mesh nets were placed in the most affected areas.



MONITORING SYSTEMS AND / OR FAUNA DETERRENCE

The project developed and implemented devices that produce several types of sounds and ultrasounds when detecting approaching animals such as owls and their prey (small mammals, like mice). These are expected to promote the deterrence of animals from roads.

To also reduce the risk of electrocution of large birds on the powerline poles, the project developed a device that produces loud sounds when a bird approaches, discouraging an animal from perching.

In National road EN4, reflectors were implemented to redirect the light of the vehicle headlights to the surrounding areas, preventing owls from approaching the road. Even within the scope of the project, a system that collects images while traveling on the roads was implemented and, through an algorithm, it is able to automatically identify some roadkilled animals.



CONSERVATION ACTIONS



CREATION OF BIODIVERSITY MICRO-RESERVES ON THE ROAD VERGES AND ECO-TRAILS

These places are areas of refuge for many species of flora and fauna, especially when the roads cross areas highly modified by man. If properly managed, these habitats can contribute to the biodiversity enrichment of a region. For this purpose, vegetation was selectively cut, exotic species were removed and replaced by native plants, shrubs were planted, and mixtures of seeds were applied in some areas of the project.



PROMOTION OF BIODIVERSITY "ISLANDS" UNDER HIGH VOLTAGE POWERLINE BASE POLES

The powerline poles occur equidistantly in the landscape. The promotion of vegetation in these places creates an opportunity for a refuge of wildlife and flora and facilitates the movement of small animals. To create these micro-reserves, some powerline base poles were sealed, excluding agricultural activity. Some of these plots were sown and / or planted with several native plants.

REHABILITATION OF A GREENHOUSE AND CREATION OF A PLANT NURSERY

To meet the needs of indigenous seeds and plants for the project actions, a greenhouse was rehabilitated and a plant nursery was installed to produce and store native plants.



CONTROL OF EXOTIC AND INVASIVE FLORA

Along the roads and eco-trails, some control actions on exotic and invasive flora (*Acacia* sp., *Arundo donax*, *Ailanthus altissima* and *Robinia pseudoacacia*) were carried out. The control of these species was done using improved techniques, minimizing the use of herbicides.



CONSERVATION ACTIONS

IMPLEMENTATION OF MITIGATION MEASURES FOR SMALL ANIMALS

To minimize the mortality of small animals like amphibians and mice, the project built specific culverts and barriers for these animals. These measures allow these animals to cross the road safely.

New danger road signs were also placed in areas where there is high amphibian crossings, allowing for the reduction of fauna roadkills and increasing road safety through driver awareness.



MEASURES TO ELEVATE THE OWL'S FLIGHT

Owls are the most affected by road mortality medium-sized birds, due to low flight and hunting habits on road verges. In places of high mortality, natural barriers of strawberry trees and artificial barriers of metallic mesh were implemented, to force the increase of flight height, thus reducing the risk of roadkill.



ENVIRONMENTAL EDUCATION AND VOLUNTEERING

Awareness actions are being promoted with the general public (through workshops and seminars) as well as voluntary actions. The goal is to alert for the problem of the impacts caused by linear infrastructures on biodiversity, and to involve the society in nature conservation projects.



APPLIFELINES

LIFE LINES APP

Download the **LIFE LINES** app on **Google Play** and cooperate with us in the registration of roadkilled animals. Your observations will integrate a national roadkill database. In addition, they will help us to understand the reasons why animals cross roads and create measures to reduce roadkills. Be part of this team and help us to preserve our species!





Coordinating beneficiary:



UNIVERSIDADE
DE ÉVORA

Associated beneficiaries:



universidade de aveiro
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Quercus

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