



LIFE LINES

Linear Infrastructure Networks
with Ecological Solutions



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with Ecological Solutions

LIFE14 NAT/PT/001081

LAYMAN'S REPORT



UNIVERSIDADE
DE ÉVORA



U. PORTO

FACULDADE DE CIÊNCIAS
UNIVERSIDADE DO PORTO



universidade de aveiro
theoria poiesis praxis



CÂMARA
MUNICIPAL
DE ÉVORA



Start Date: 01/08/2015 | **End Date:** 31/05/2021

Total Budget: 5,540,485 € (3,324,303 € EC contribution)

Coordinating Beneficiary: Universidade de Évora

Associated Beneficiaries: Infraestruturas de Portugal SA, Câmaras Municipais de Évora e Montemor-o-Novo, Marca - Associação de Desenvolvimento Local, Quercus - Associação Nacional de Conservação da Natureza, Universidades de Aveiro e do Porto (Faculdade de Ciências)

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Erika Almeida, Ana D. Sampaio

WHY?

Thousands of animals die every year in **linear transport and energy infrastructures**, either killed in roads or railways, or by electrocution or collision with medium- and very-high-voltage power lines. With the expanding network of transport and energy supply infrastructure in Portugal over the last decades, animal mortality became an imposing reality, assuming itself as the main non-natural cause of death for animal species in many parts of the country.

Additionally, the expansion of linear infrastructure networks is one of the main causes of fragmentation and loss of natural habitats, **creating barriers and repelling species which contribute to further isolation of populations.**

Moreover, the introduction and dissemination of invasive exotic flora is often facilitated across linear infrastructure networks. Despite this, vegetated areas associated with the linear infrastructure may also be an opportunity for biodiversity conservation, promoting habitat in adverse landscape contexts and enabling animals and plants to thrive and disperse.

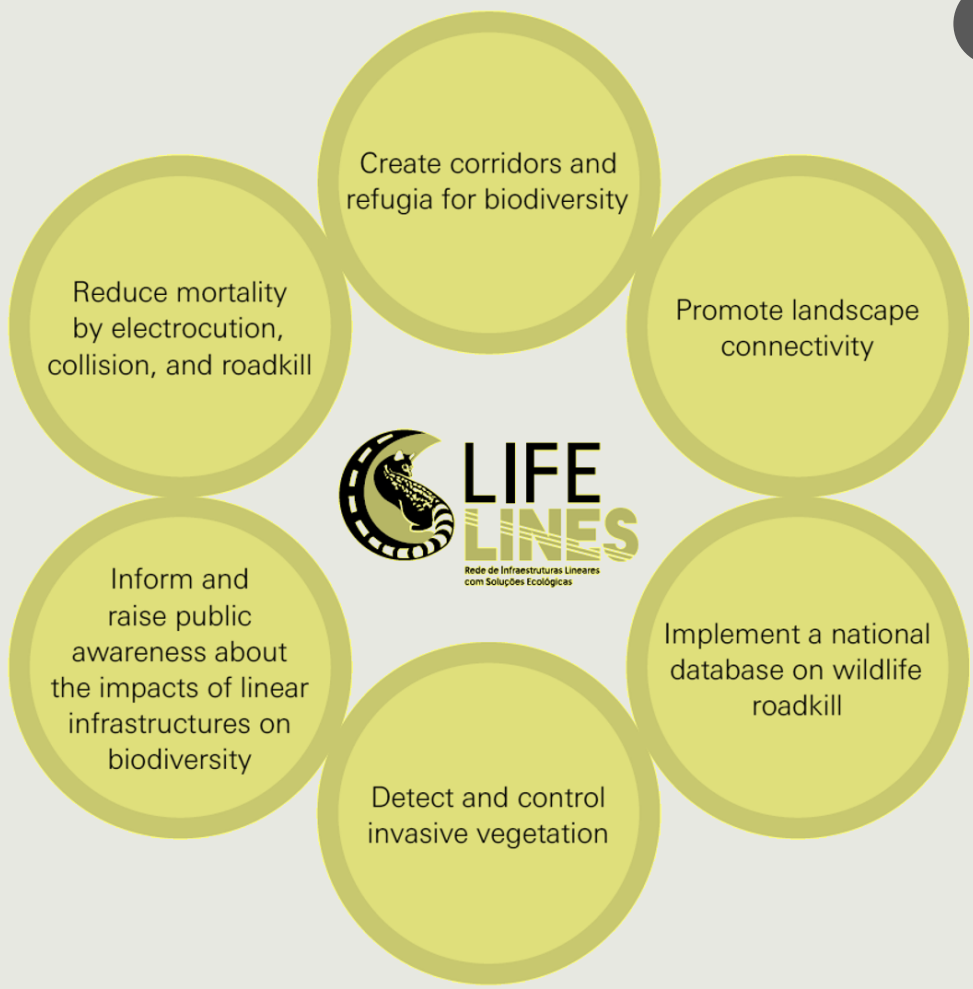
Solutions are needed to make the presence of the linear infrastructures compatible with nature conservation!





The LIFE LINES project – Linear Infrastructure Networks with Ecological Solutions (LIFE14NAT/PT/001081) aimed to **essaying, evaluating and disseminating practices** directed at **mitigation of negative effects** from **transport/energy infrastructures** in wild fauna and simultaneously promote the creation, along them, of a demonstrative **Green Infrastructure**, based in **corridors and stepping stones** that can increment connectivity and improve conservation of local/regional biodiversity.

OUR GOALS



The **intervention area** of LIFE LINES is crossed by the **main land transport corridor between Lisbon and Madrid**. There is a high density of power lines, roads, and a highway.

The area has 210 000 ha and encompasses the municipalities of Évora, Montemor-o-Novo, Estremoz, Arraiolos and, to a lesser extent, Vendas Novas and Monforte.

WHERE

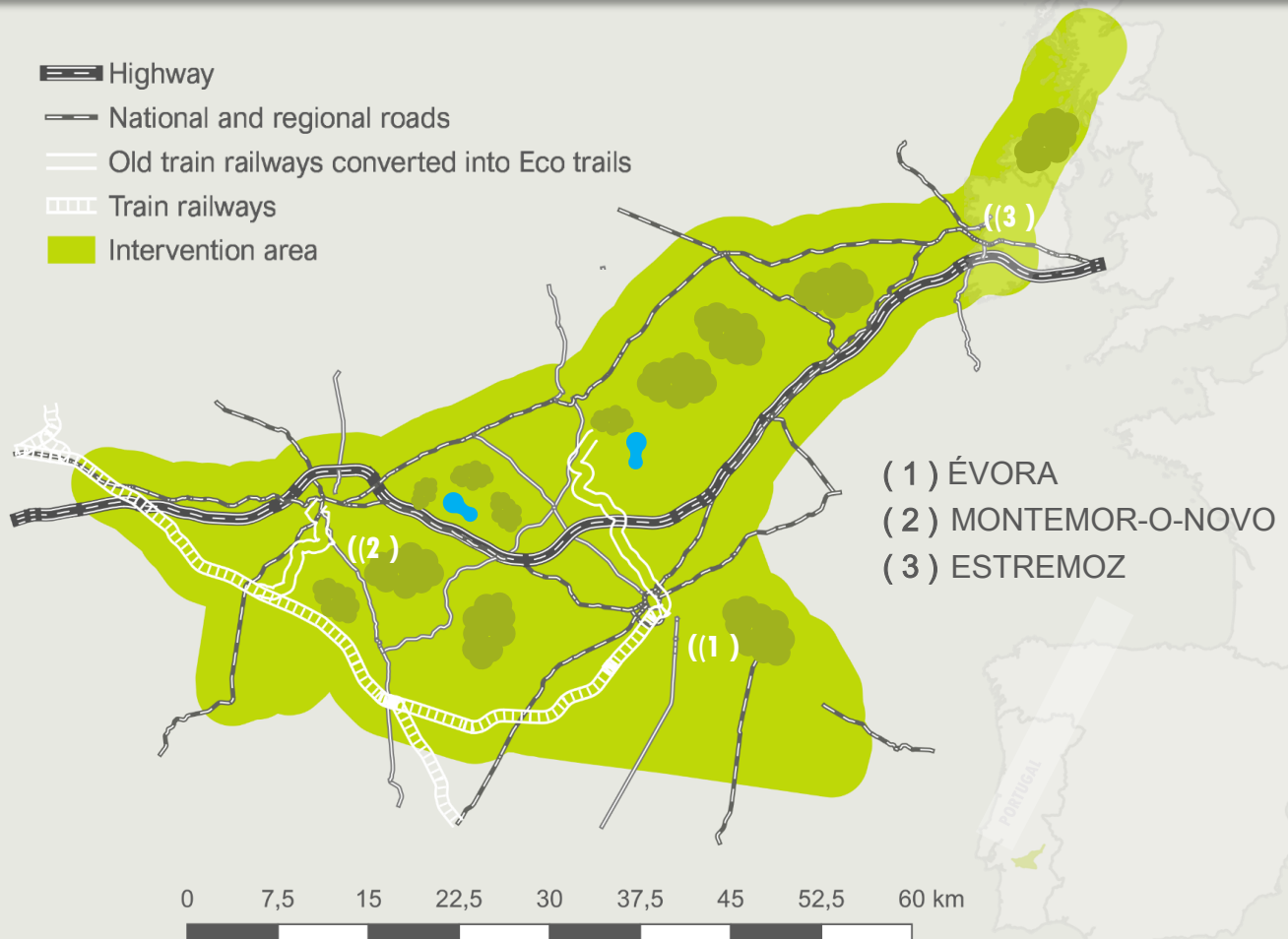


2015 - 2021



Central Alentejo

TP



IMPACTS OVERVIEW

The project focused on a set of formerly **identified impacts** including those of:

- ☑ Connectivity reduction, mortality and barrier effects of transport infrastructures;
- ☑ Mortality in power lines;
- ☑ Absence of refuges and corridors;
- ☑ Control of invasive flora;
- ☑ Scarcity of publicly available decision support data.



The project encompassed 35 actions included in five main groups:

ACTIONS

A

7 preparatory actions were needed to backup conservation actions.

- ✓ Implementation of a nursery for the production of native plants and seeds
- ✓ Application of innovative remote sensing techniques to identify and locate 5 invasive plant species
- ✓ Development of 2 monitoring and 5 deterring prototypes to keep animals away from dangerous areas



C

10 conservation actions were mostly based on the implementation, development and testing of demonstrative and innovative solutions.

- ✓ Solutions to mitigate road mortality and barrier effects
- ✓ Solutions to mitigate collision and electrocution in powerlines
- ✓ Solutions to promote biodiversity in linear infrastructures
- ✓ Solutions for monitoring and reporting data



D

3 monitoring actions evaluated the effects of implemented measures.

- ✓ Mortality reduction and overall biodiversity indicators
- ✓ Ecosystem functioning and services
- ✓ Socioeconomic impact



E

11 public awareness and dissemination actions.

- ✓ Academia, road agencies and concessionaries, volunteers, schools, policy and decision-makers, environmental consultancy, among others, and public in general



F

4 management actions.

Solutions to mitigate road mortality and barrier effects

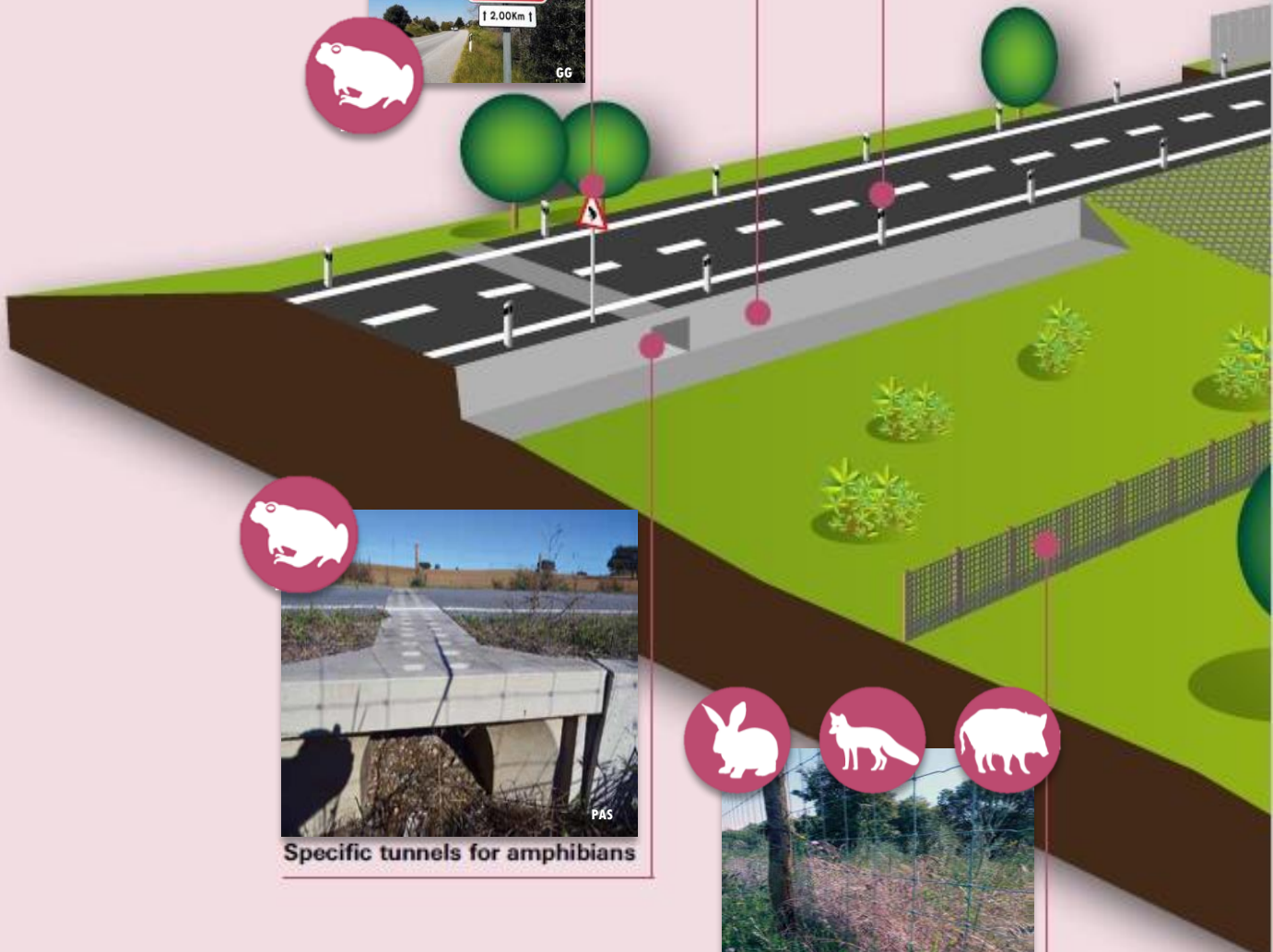


Permanent concrete barriers / temporary canvas barriers

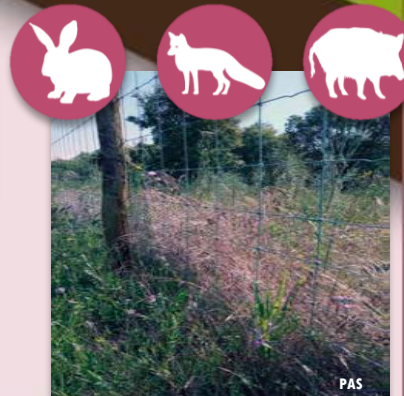
Warning road sign



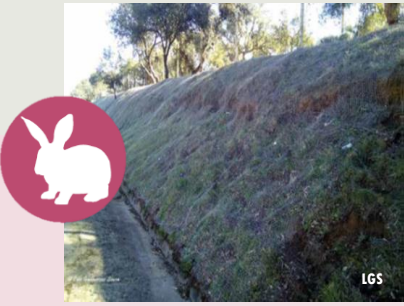
Wildlife warning reflectors



Specific tunnels for amphibians



Fences with additional L-shaped mesh

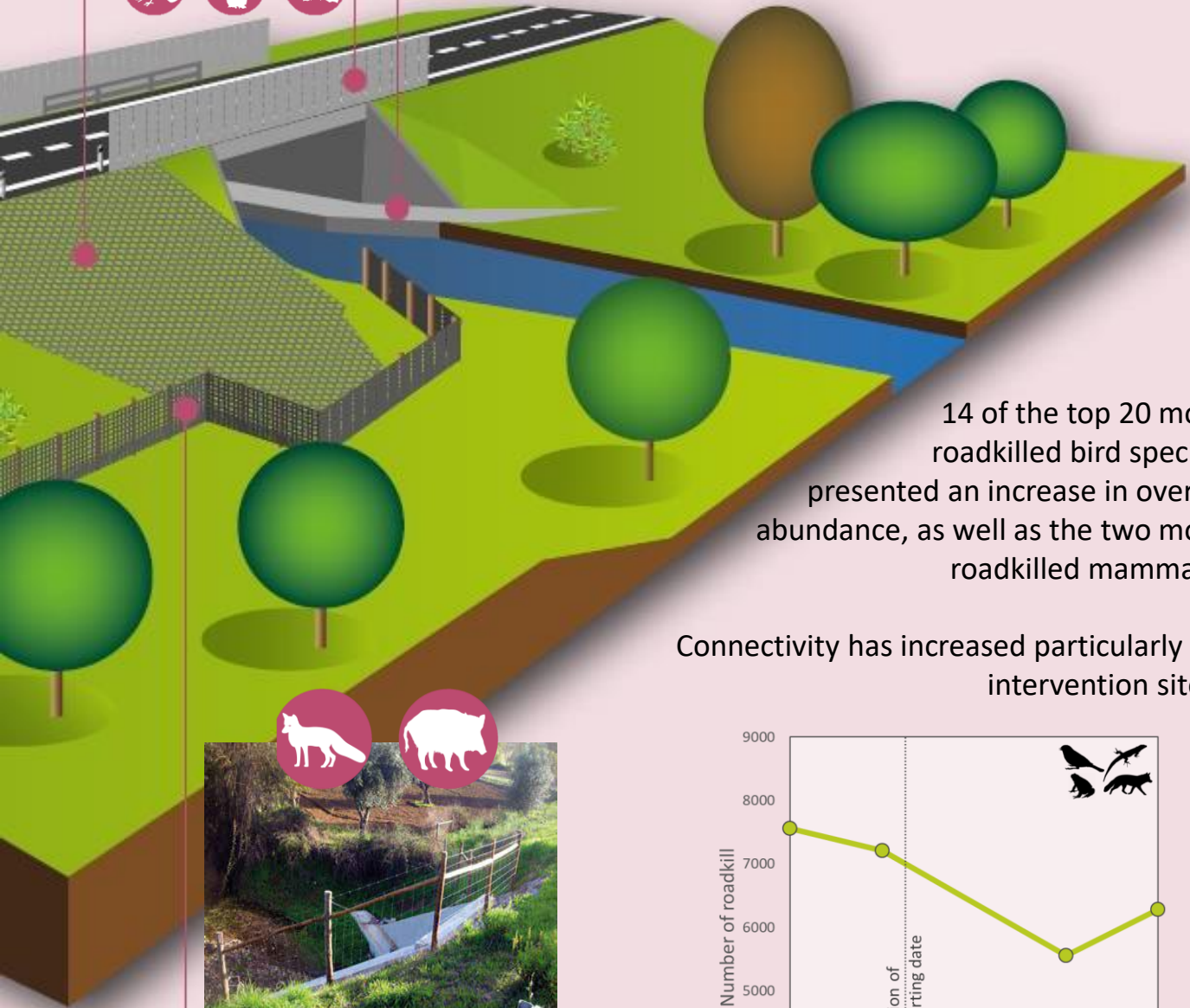


Deterring mesh for rabbits



Culverts with dry ledges

Mesh barriers to elevate flight height

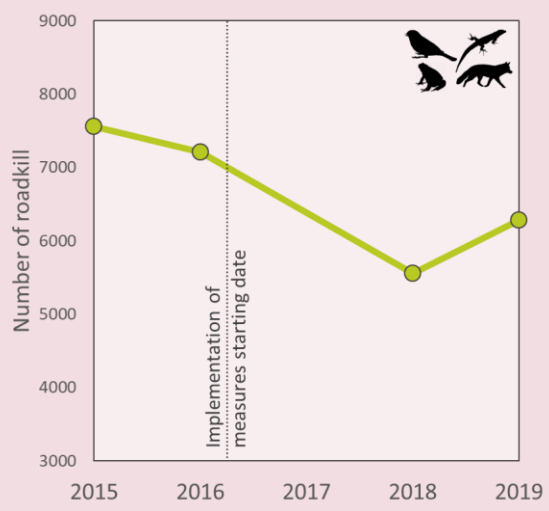


Fences with progressive mesh

Birds and bats had significant decreases in road mortality, while amphibians and owls showed non-significant decreasing trends.

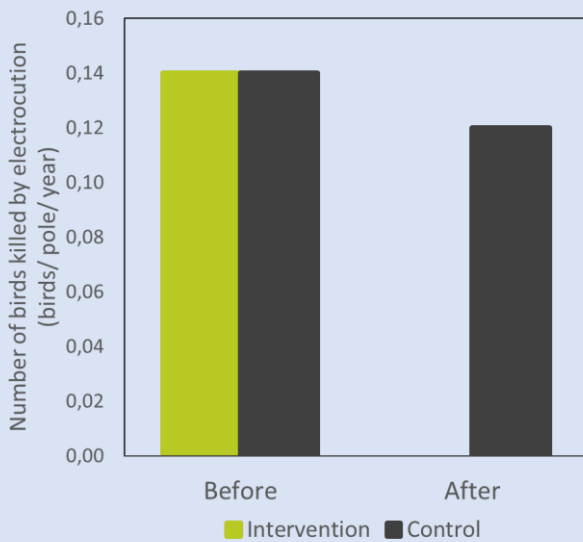
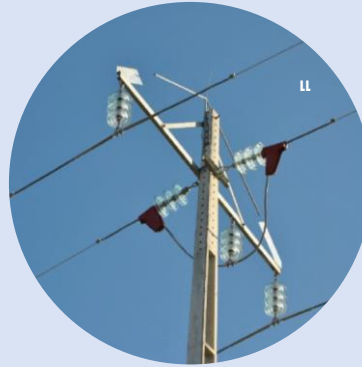
14 of the top 20 most roadkilled bird species presented an increase in overall abundance, as well as the two most roadkilled mammals.

Connectivity has increased particularly on intervention sites.



Solutions to mitigate collision and electrocution in power lines

The new pole frame (**ECO-HAL A2S**) developed for medium voltage power lines was highly effective in reducing electrocution.



Observed Mortality Rate (birds/electric pole/year) for electrocution, before and after ECO-HAL A2S installation, including both intervened and control sections (no intervention).

Deterring devices for birds **showed potential** to prevent some medium and large bird species from perching on electrical poles and power lines, making it a valuable tool for bird conservation.



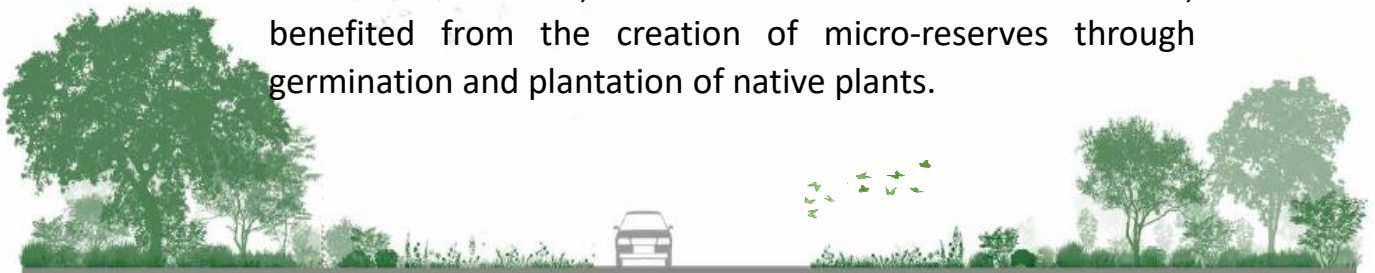
Solutions to promote biodiversity in linear infrastructures

Invasive alien plant species (IAS) control revealed challenging but have contributed to lower its cover in road verges and ecotrails, benefiting the recovery of native species. **Overall biodiversity indicators show reductions of 36% for IAS in the area.**



Seed-mixtures largely contributed for the indicators of the floristic community increasing local biodiversity either in road verges, ecotrails or poles of powerlines.

Animal communities, such as small mammals and butterflies, benefited from the creation of micro-reserves through germination and plantation of native plants.



Public awareness and dissemination

We need to raise awareness.

To understand is the first step to protect.

A large part of the project was dedicated to the dissemination of the results to other potential users (mostly professionals associated with the area), both national and international, and promoting awareness of citizens in general.

Volunteer Program for young people:
151 volunteering activities,
3122 volunteers

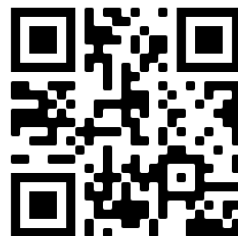
'Adopt a road' Program:
environmental education and
awareness program:
51 activities, 3056 participants
from young to elder ages

Communication:

- ✓ 1 communication plan
- ✓ > 700 news, including 15 in national TV, 175 in journals, 78 radio spots and interviews
- ✓ 20 teasers, 20 thematic videos and one documentary produced

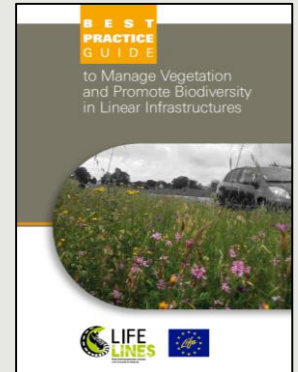


www



During the execution of the project 1 large and 64 medium size **outdoors** were installed.

Training and dissemination among stakeholders included **12 Workshops** and **4 Best Practice Guides** produced.



Some of the organized events:

- IENE 2020 International Conference
- LIFE LINES Final Seminar
- 3 public seminars
- LIFE LINES Open Day



Involvement of the academic community:

- Four PhDs and six Master thesis
- Fourteen scientific papers
- Outreaching over 400 students

Socioeconomic accomplishments:

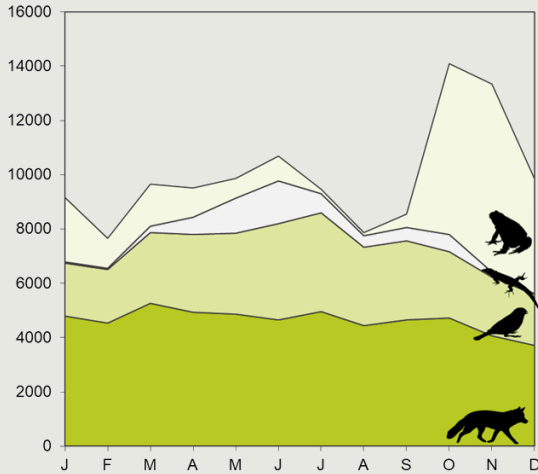
- More than 748 000 € were invested in more than 180 local companies;
- 27 direct jobs were created;
- About 20 collaborations and protocols were signed;
- Nearly 300 people were trained and qualified to perform conservation



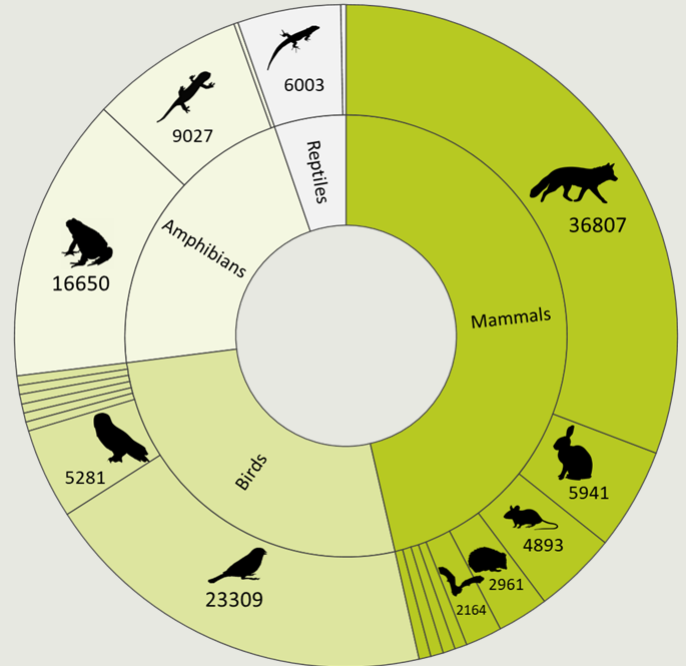
Project flyer

Tools for the future

The creation of the **National Roadkill database** stands as one of the most successful reporting tools, gathering over 120 000 records of 230 animal species roadkilled in a common effort linking academy, road agencies and concessionaries, and traffic and environmental police.



Monthly cumulated roadkill numbers per group



Number of records per group collected in the National Roadkill Database

The **LIFE LINES App** gathers data from almost 1000 users and contributed with 25% of the data since its release.



The **Mobile Mapping System (MMS3)** for automatic detection of roadkill fauna, developed under the project, allows for an 80% of effectiveness identification while conducting at 60km/h monitoring.



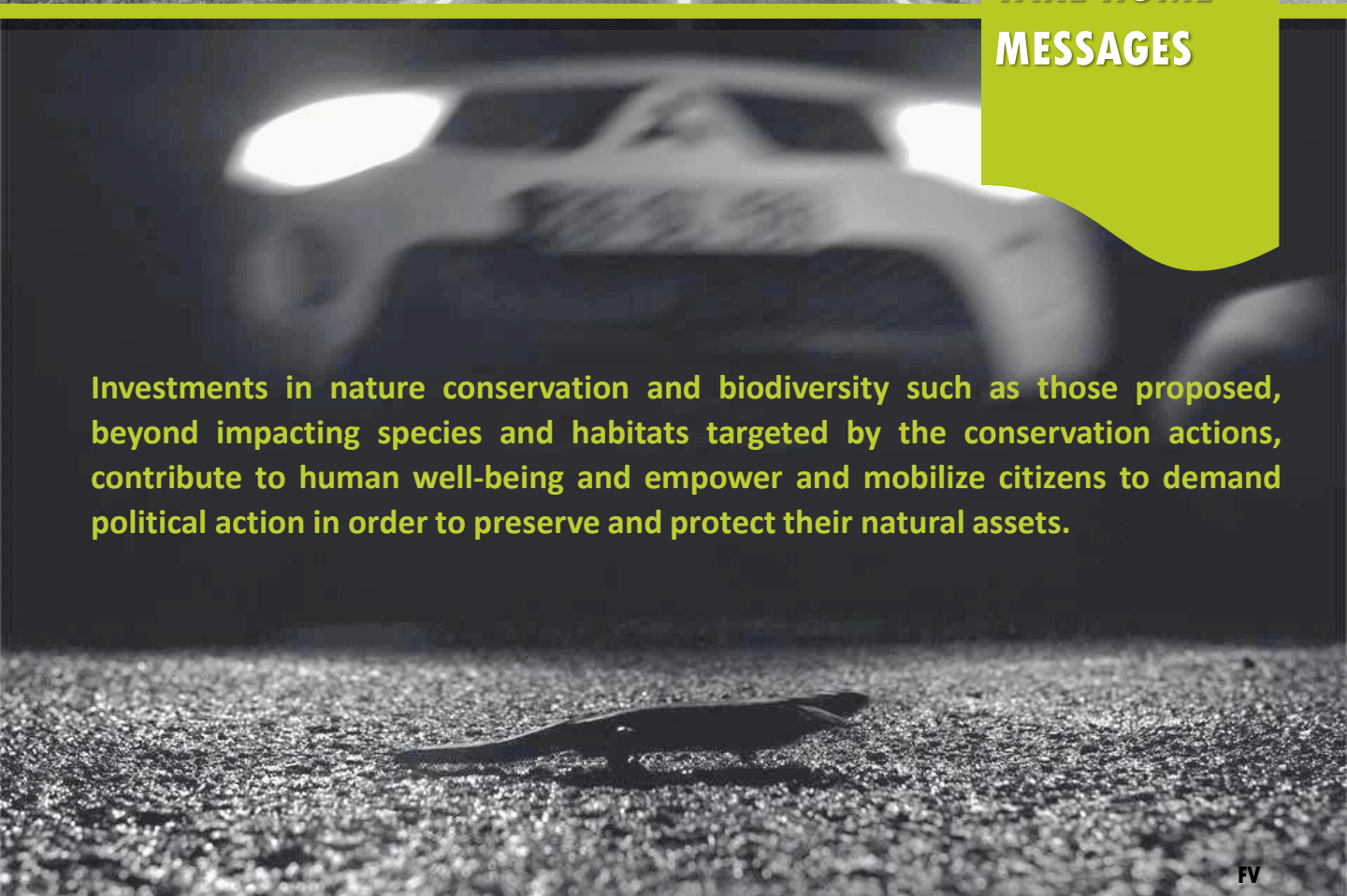
LIFE LINES essayed and disseminated solutions that increased the sustainability of different types of linear infrastructures.

In the context of our project, usual functions of transportation and energy delivery were complemented with different kinds of ecological functions, and we expect that they can be replicated worldwide by most linear infrastructure operators.



TAKE HOME MESSAGES

Investments in nature conservation and biodiversity such as those proposed, beyond impacting species and habitats targeted by the conservation actions, contribute to human well-being and empower and mobilize citizens to demand political action in order to preserve and protect their natural assets.



FV



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Facebook | www.facebook.com/lifelinesconservation

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Co-financier:



LIFE-LINES (LIFE14 NAT / PT / 001081)
Linear Infrastructure Networks with
Ecological Solutions 60% co-financed
project by the LIFE - Nature and Biodiversity
Program of the European Commission

Coordinating beneficiary:



Associated beneficiaries:



Collaborators

