Using landscape graphs to evaluate and mitigate the impacts of major transport infrastructure on species

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Graphab 1: Using **landscape graphs** to assess the **impact** of major transport infrastructures on species

- Connectivity metrics at $t_0$ (without infrastructure) and $t_1$ (with infrastructure)
- Diachronic analysis
- Mapping the areas disturbed by the infrastructure
Graphab 2: Using landscape graphs to guide field operations for reducing the impact on connectivity.

Method: modelling of ecological networks using graph theory.
**Research questions**

**Objective 1**: An evaluation of the relevance of the landscape graph modelling for decision-making in landscape management
- Evaluating planned infrastructure tracks
- Optimizing the location of wildlife crossings

**Objective 2**: A sensitivity analysis of results according to the quality and the accuracy of data, to ensure the reproducibility of the method
2. Preliminary results

**Objective 1**: Using landscape graphs to guide mitigation measures

- Choice of a TGV line track
- Optimization of the localization of wildlife crossing structures
2. Preliminary results

9 tracks proposed

Which one potentially impacts the less the landscape connectivity?
2. Preliminary results
2. Preliminary results
2. Preliminary results

**Objective 1**: Using landscape graphs to guide mitigation measures

Choice of a TGV line track

Optimization of the localization of wildlife crossing structures
Graphab 2

2. Preliminary results

Surface des taches (ha)
- 1 - 100
  - 100 - 366 — Liens
  - 366 - 924 — Branche est de la LGV Rhin-Rhône
  - 924 - 2545

Profil : 1 ha - 1 km

Profil : 100 ha - 10 km

Profil : 1000 ha - 100 km
2. Preliminary results
2. Preliminary results

STEP : 0
STEP: 1

Test of each link
2. Preliminary results

**STEP : 1**

Test of each link
2. Preliminary results

**STEP : 1**

Test of each link
2. Preliminary results

**STEP : 1**

Test of each link
2. Preliminary results

**STEP : 1**

Test of each link
2. Preliminary results

**STEP : 1**

Test of each link

![Diagram of a network with nodes and links, possibly representing a graph or network analysis diagram.](image)
2. Preliminary results

**STEP : 1**

Test of each link
2. Preliminary results

**STEP : 1**

Test of each link

Localization of the first best link
2. Preliminary results

**STEP : 1**

Test of each link

Localization of the first best link

**STEP : 2**

Test of each link
2. Preliminary results

STEP : 1
Test of each link

Localization of the first best link

STEP : 2
Test of each link
2. Preliminary results

**STEP : 1**

Test of each link

Localization of the first best link

**STEP : 2**

Test of each link
2. Preliminary results

**STEP : 1**

Test of each link

Localization of the first best link

**STEP : 2**

Test of each link
Graphab 2

2. Preliminary results

**STEP : 1**

Test of each link

Localization of the first best link

**STEP : 2**

Test of each link
2. Preliminary results

**STEP : 1**

Test of each link

Localization of the first best link

**STEP : 2**

Test of each link


2. Preliminary results

**STEP : 1**

Test of each link

Localization of the first best link

**STEP : 2**

Test of each link
2. Preliminary results

**STEP : 1**

Test of each link

Localization of the first best link

**STEP : 2**

Test of each link

Localization of the second best link
2. Preliminary results

**STEP : 1**

Test of each link

Localization of the first best link

**STEP : 2**

Test of each link

Localization of the second best link

...
2. Preliminary results
2. Preliminary results
2. Preliminary results
2. Preliminary results

Rate of variation of the PC-index value according to the rank of the new patch

2. Preliminary results

Published papers

Submitted papers
Girardet X., Conruyt-Rogeon G., Foltête J-C. Does the regional landscape network influence the location of roadkill hotspots? *Journal of Environmental Management*

Clauzel C., Bannwarth C., Foltête J-C. Integrating regional-scale connectivity in habitat restoration: an application for amphibian conservation in eastern France. *Journal for Nature Conservation*

Papers in preparation
Clauzel C., Li L., Giraudoux P. The impact of the major roads on connectivity of high altitude forests: an application to the snub-nosed monkey habitat in Yunnan, China.

Girardet X., Foltête J-C. Ecological network restoration: where to locate wildlife crossing structures to enhance regional landscape connectivity?

Girardet X., Foltête J-C. Integrating landscape connectivity analyses into the decision making process of linear infrastructure track localization.
3. Remaining work

Application of the proposed methods on two other study areas:
the Yunnan province (China) and the Gresivaudan (France)

Objective 2:
to test the reproducibility of the method in different geographical contexts
3. Remaining work

Yunnan province – high-altitude forests networks

*collaborations with Chrono-Environment Lab and the Yunnan University*

Impact of the new highway on connectivity?

Connectivity improvement with the tunnel portion and the reforestation?

Could these projects restore the initial state of connectivity?
3. Remaining work

Gresivaudan collaboration with Ecosphère and LPO Isère

- to propose solutions for improving connectivity (corridors, wildlife crossings) and compare the results with existing measures.
- to prioritize measures already proposed using graph modelling.
- to analyse the reproducibility of the protocol.
Graphab 2

Thank you for your attention

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Project managers

Funders