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BIODIVERSITY AND INFRASTRUCTURE SYNERGIES AND OPPORTUNITIES FOR EUROPEAN TRANSPORT NETWORKS

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101006661

Webinar 06.06.2024
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EUROPEAN DEFRAGMENTATION MAP
&
PLANNING PRINCIPLES FOR SAFEGUARDING CONNECTIVITY

Marita Böttcher, Heiner Reck, Cindy Baierl

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... At the same time, biodiversity regulates the climate system because it absorbs carbon dioxide from the atmosphere and stores the carbon in plant material or soil. Prof. Mark Rounsevell concludes that there are therefore two environmental crises that need to be tackled together. “Without biodiversity, climate change would be much more severe, that is the crucial point.” This is because the world's ecosystems absorb around a quarter of the total greenhouse gas emissions that humans release into the atmosphere. ...

https://www.kit.edu/kit/klimawandel-und-biodiversitat.php

BISON: INTENTION AND CONTENTS

**Roadmap to planning guidelines on European defragmentation:
Deployment of recommended practices and methods assignable for different ecoregions & transportation modes**

The goal was

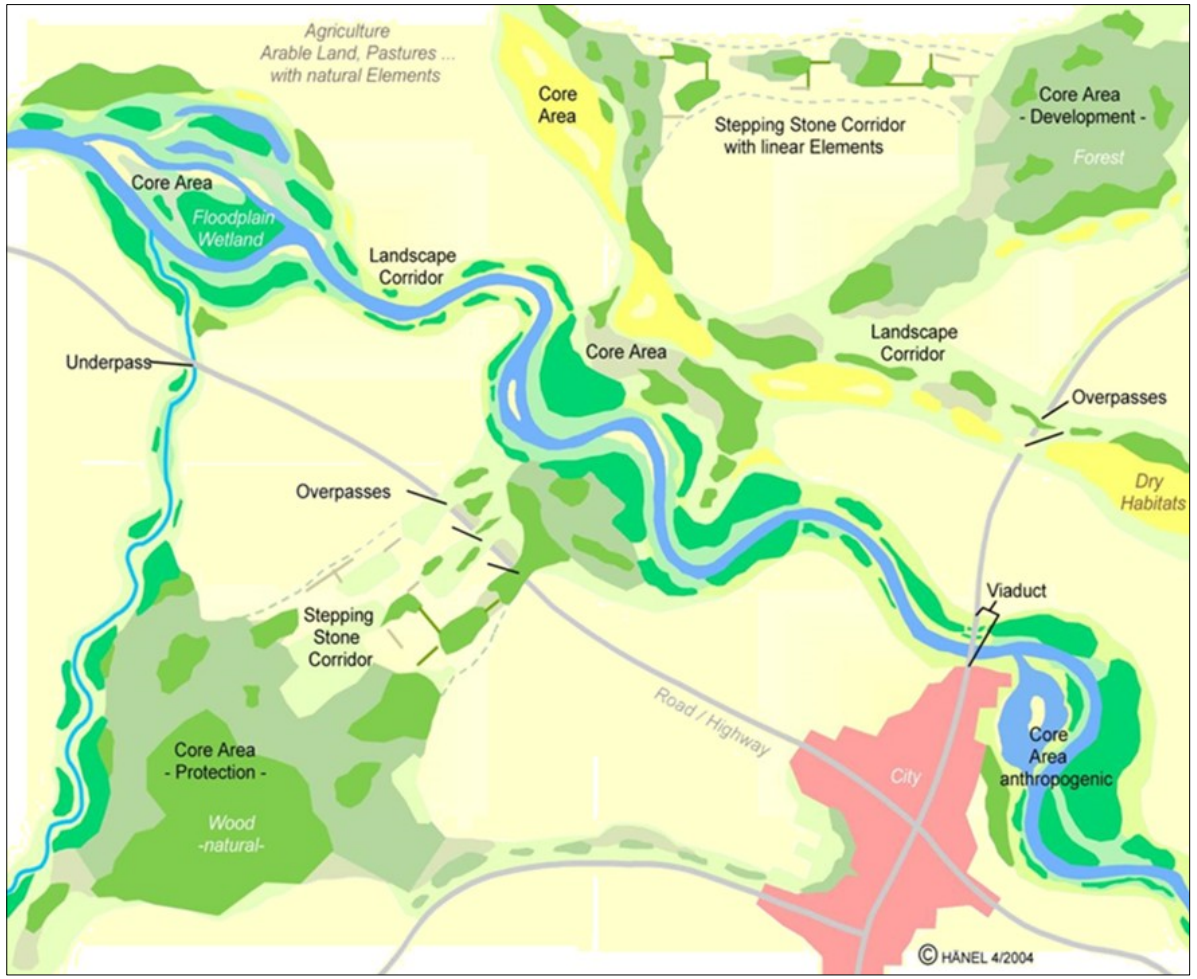
- to improve the European Green Infrastructure, especially the function of ecological corridors

- to avoid any significant further barrier effects

while developing and maintaining transportation infrastructure.

What are ecological corridors? - The Idea behind

Eco-corridor: core areas + landscape corridors, and/or stepping stone corridors and linear elements

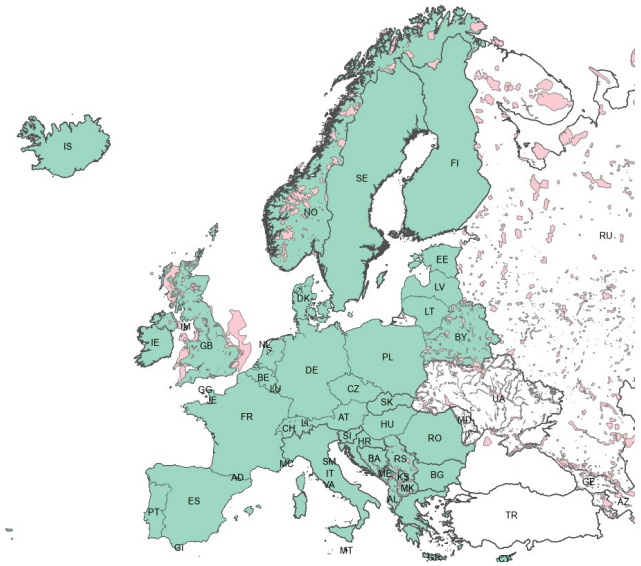


Development of a planning tool for the

- **Representation of existing and to be developed corridors for the Green Infrastructure**
- **Preservation of permeability of the landscape for biodiversity**
- **Avoidance, mitigation and compensation of fragmentation in the planning of transport infrastructure**

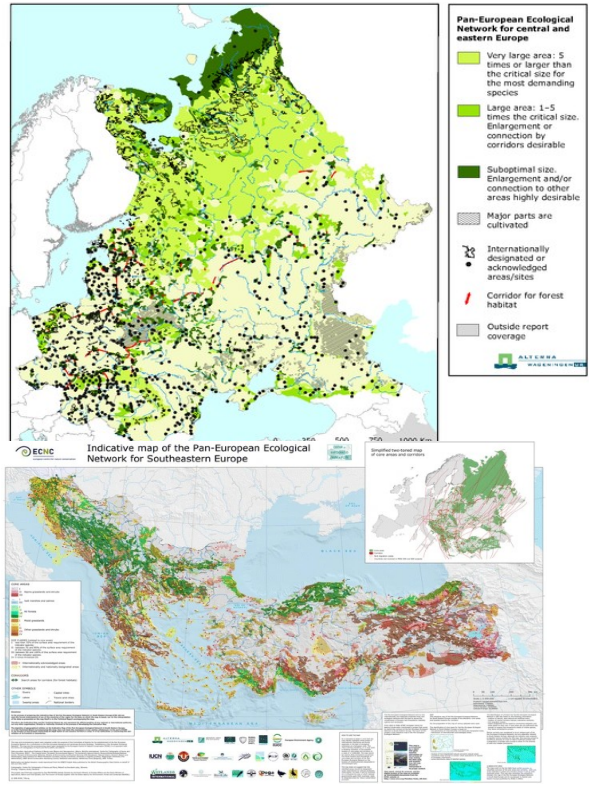
History of networks as a planning tool

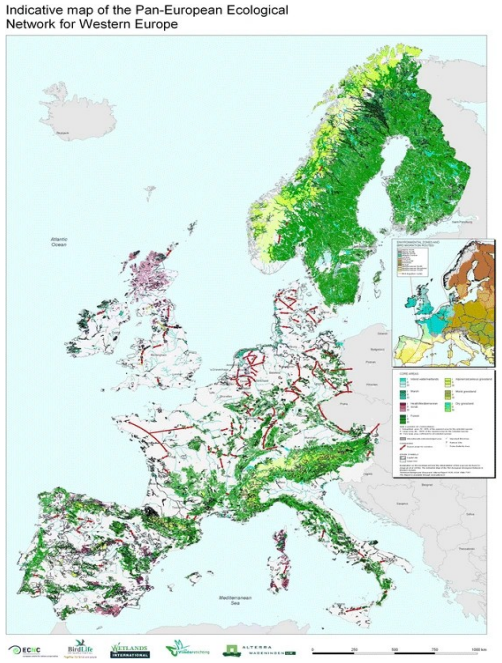
Emerald Network



Ecol. Network for the conservation of wild animal and plant species and natural habitats of European importance.
Bern Convention (1989, 1996)

PEEN (Pan European Ecological Networks for central and eastern Europe, 2002, 2006)





Identifies the core nature areas of European Importance, existing corridors between these areas, and where new corridors could and should be established to meet the conectivity requirements of key species.

No GIS-data, schematic presentation of corridors

develloped for the implementation of the CBD

SOME NOTES ON HISTORY ABOUT THE DEVELOPMENT OF THE EUROPEAN DEFRAGMENTATION MAP (EDM)

Scientific background:

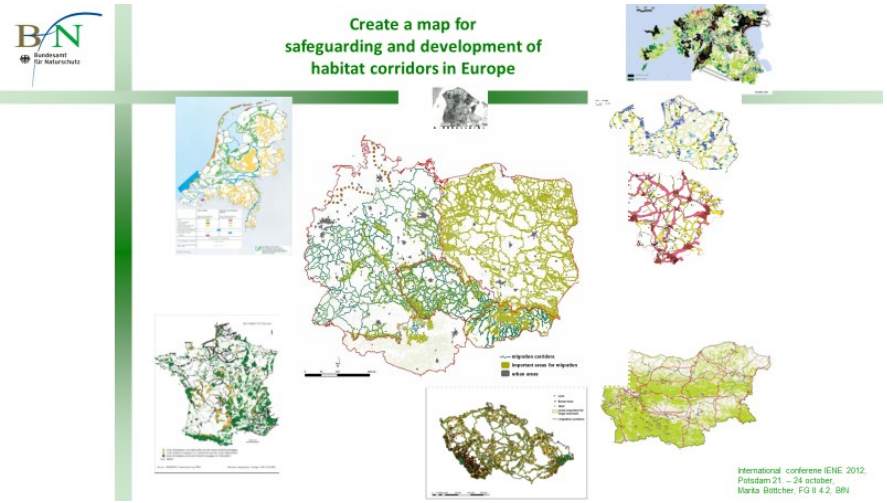
Habitat fragmentation by artificial barriers is one of the most serious threats to European biodiversity. This is because life needs mobility to sustain viable populations as well as to withstand the challenges of landscape dynamics and climate change.

IENE 2012 - Potsdam Declaration
"OVERCOME BARRIERS – EUROPE-WIDE AND NOW"
Life Needs Mobilit **Regarding this and the EU Green Infrastructure Strategy, and the White Paper on Transport the IENE 2012 conference participants strongly recommend: to develop an integrative**

European Defragmentation Program

IENE-Conference Eindhoven, 2018
"CONNECTING EUROPE, CONNECTING NATURE"
We - the IENE community – therefore call the European Commission to support the development of a

European Defragmentation Program,
as a synergy between the TEN-T and TEN-G strategies.



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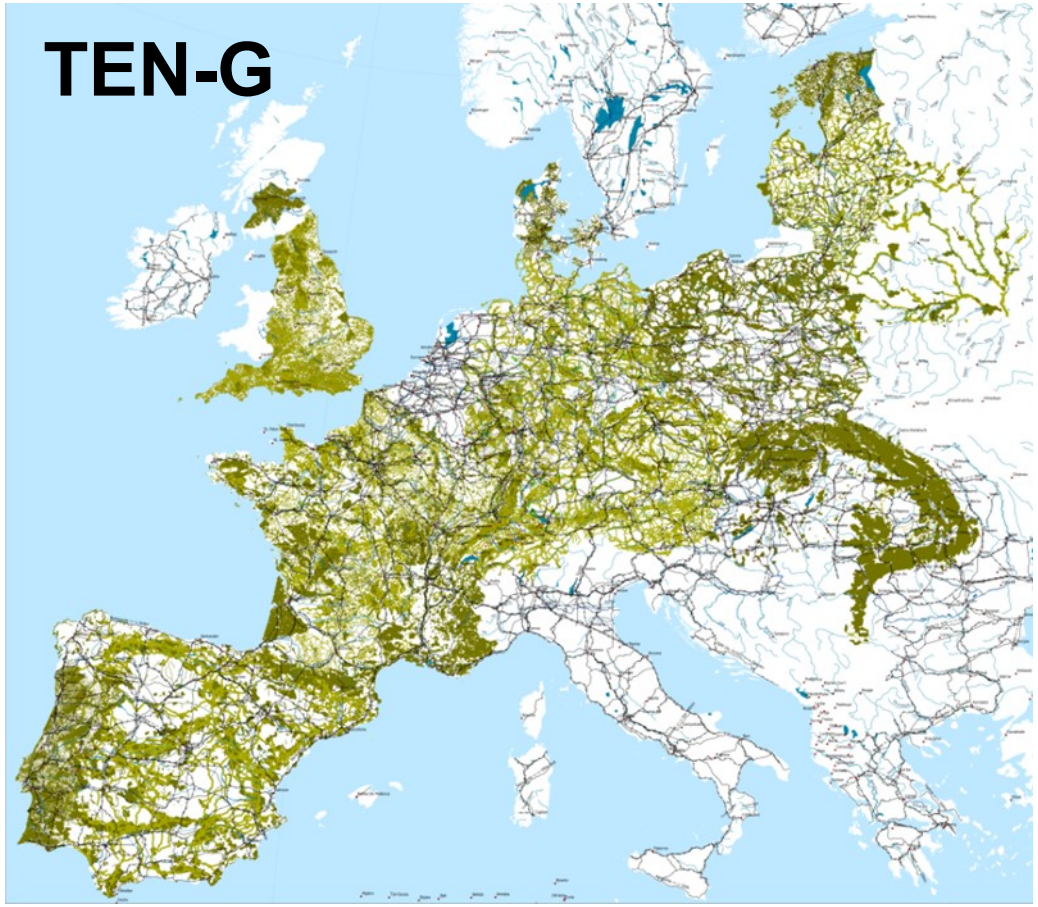
EUROPEAN DEFRAGMENTATION MAP (EDM)

Ecological Networks on national/transnational level

- **Consideration in the EDM as**
  - generalized
  - cores and corridors (not ecosystem specific)
- **Process of integration**
  - Selection of relevant network elements
    potential, to be developed or restored elements, as well as buffer zones were not considered
  - Generalization
    elimination of ecosystem-specific differentiations
  - Unification
    in the presentation and if possible differentiation in cores and corridors



EUROPEAN DEFRAGMENTATION MAP (EDM)

Ecological Networks on national/transnational level

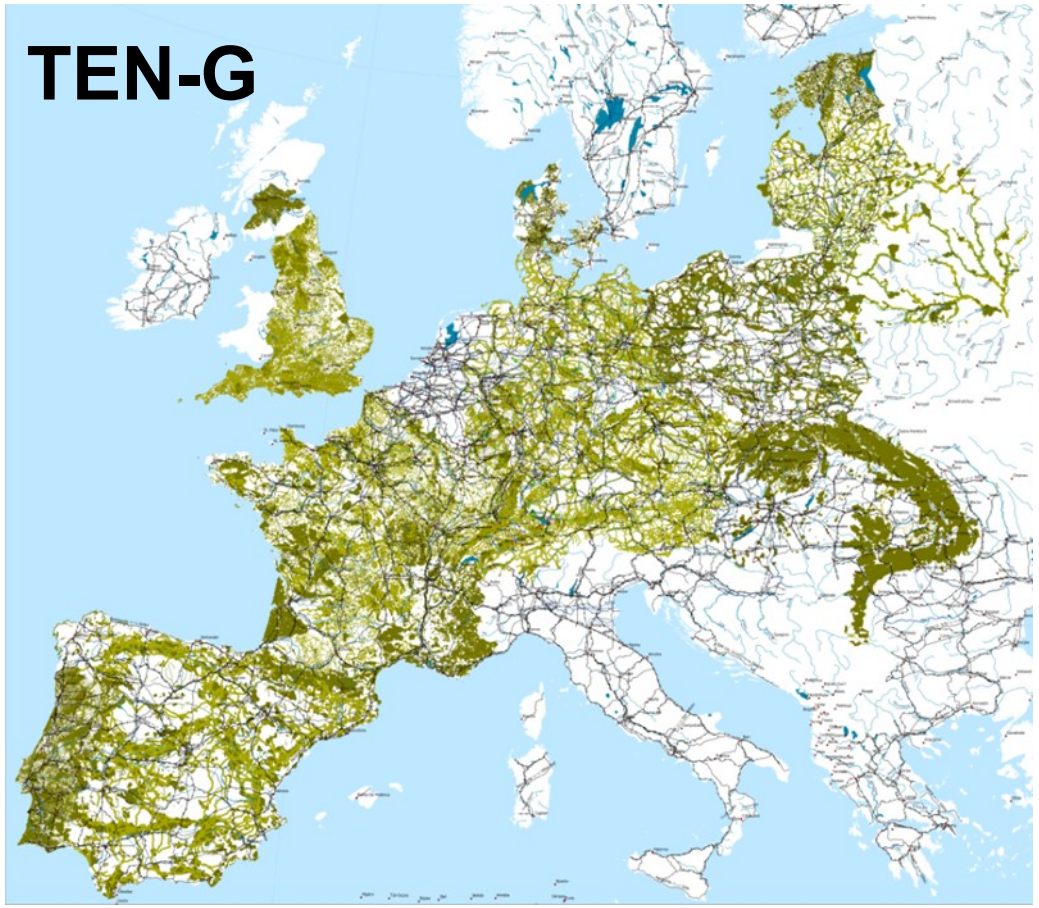
so far integration for 17 European countries
& 2 transnational areas

- **Overview Countries/national level:**

Austria (AT), Belarus (BY), Belgium (BE) only Flanders, Czech Republic (CZ), Germany (DE), Great Britain (GB, England, Central Scotland, Wales), Denmark (DK), Estonia (EE), France (FR), Hungary (HU), Lithuania (LT), Latvia (LV), Netherlands (NL), Poland (PL), Portugal (PT), Slovakia (SK), Spain (ES), Switzerland (CH)

- **Overview transnational level:**

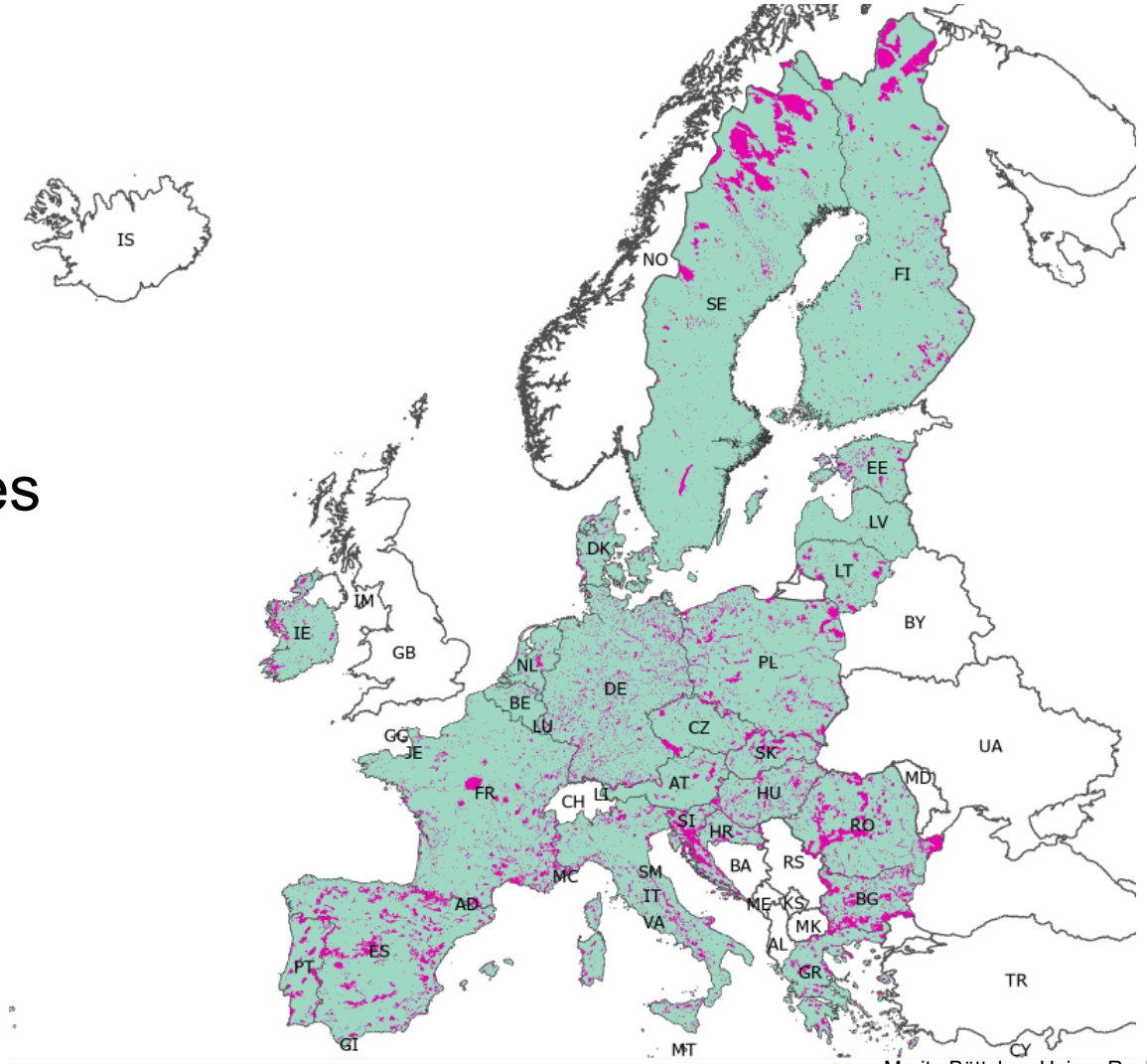
- Carpathian Corridors (CZ, SK, HU, PL, RO, RS, UA)
- Alp-Carpathian-Corridor (AT, SK)
- In prep. : Alp-Atlas (DE, FR, CH, AT, SI)



EUROPEAN DEFRAGMENTATION MAP (EDM)

Overview of integrated data : Natura 2000 Network

- **Facts**
  - For protection of Europe's most valuable and threatened species & habitats
  - 8 % of the EU's land area
  - stretches across all 27 EU countries
- **Consideration in the EDM**
  - Sites of the Habitats Directive: Sites of Community Importance (SCIs) & Special Areas of Conservation (SACs)
  - Various land area coverage



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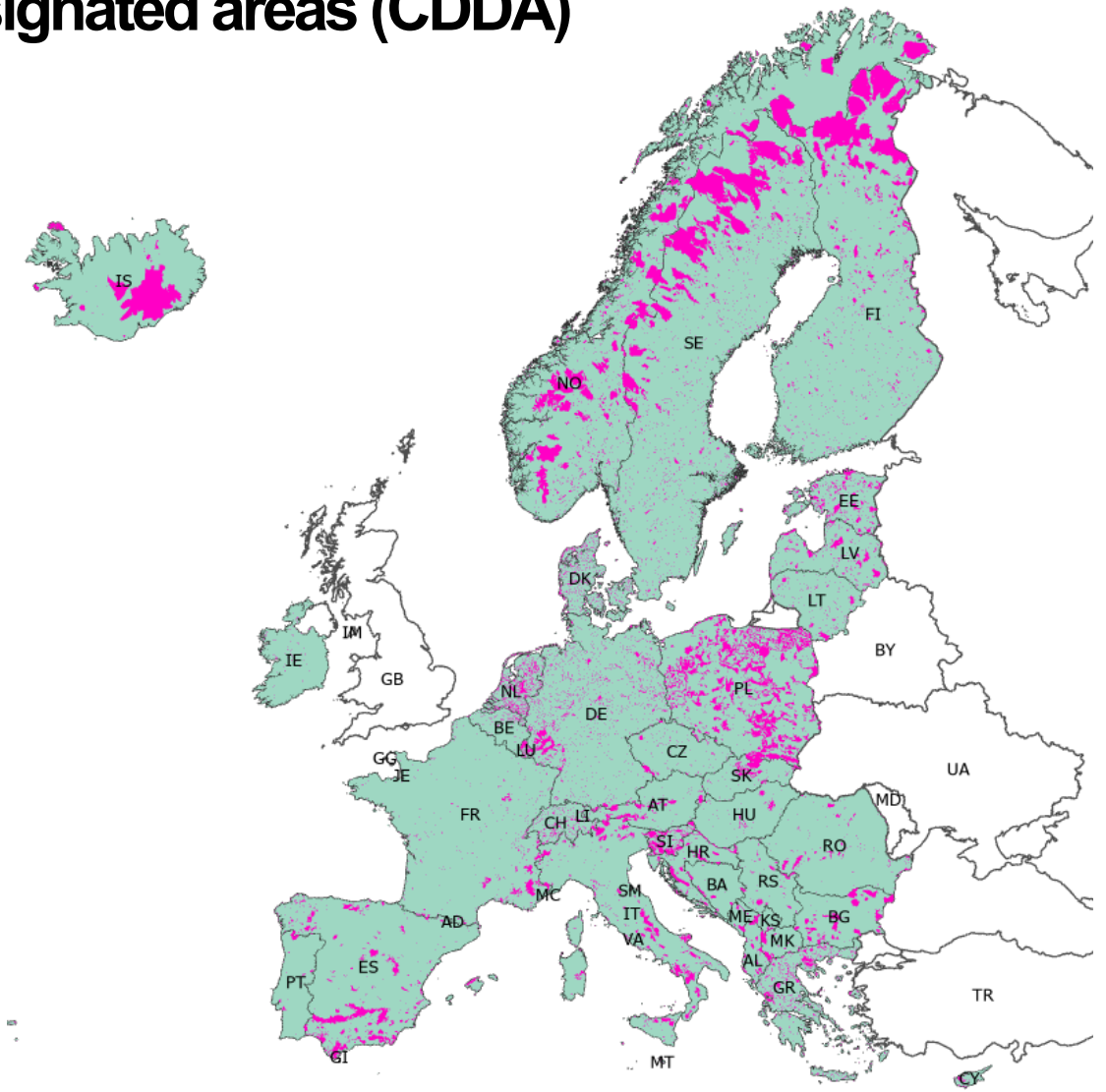
EUROPEAN DEFRAGMENTATION MAP (EDM)

Overview of integrated data : Nationally designated areas (CDDA)

CDDA: Common Database on Designated Areas =
European Inventory of Nationally designated Areas



- **Facts**
  - CDDA = European inventory of nationally designated areas
  - protected area information from 37 European countries

- **Consideration in the EDM**
  - IUCN I to IV

  - Various land area coverage

EUROPEAN DEFRAGMENTATION MAP – EDM

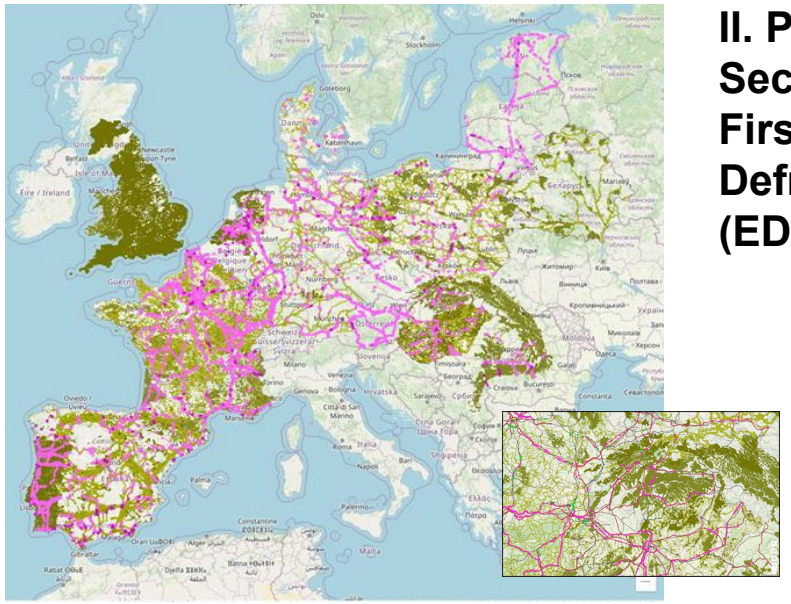
First proposal of rules to estimate the barrier effect on European scale

Step	Method
1	Selection of criteria from the list „criteria for assessing defragmentation needs across TI of European importance“ with regard to their significance for habitats and species at European Scale
2	Selection of criteria from the list „criteria for assessing the barrier effect of TI“ with regard to their impairment severity
3	Ranking of the selected criteria with regard to their significance for habitats and species at European Scale importance of source and target habitats
4	Ranking of the selected criteria with regard to the impairment severity of the barrier effect/content / number of core habitat and protected areas…
5	First preliminary rules to determine the conflict areas

Visualisation of conflict areas

Existing and planned grey Infrastructure in Europe: TransEuropeanNetwork – Transport (TEN-T)

I. First indicative Map of planned and existing Green Infrastructure in **Europe: TransEuropeanGreen (TEN-G)**



II. Possible Restauration Sections of TEN-G: First indicative European DefragmentationMap (EDM)

PERSPECTIVE : EUROPEAN DEFRAGMENTATION MAP

Update of the Map // Contents // R+D-needs


Source: pixabay

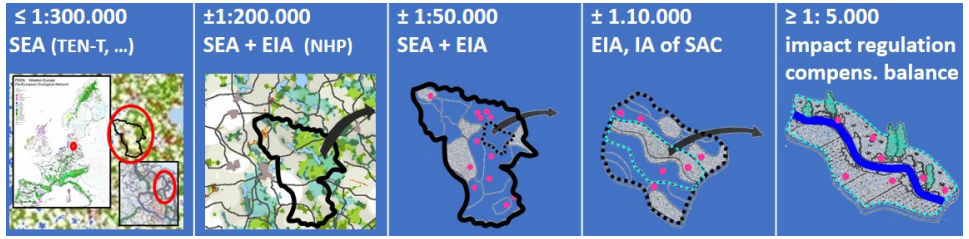
Improving data quality and closing data gaps

- E. g. with remote sensing data, using Artificial intelligence
- Habitats // Habitat quality on EU-Level (automatic habitat classification with remote sensing)
- Creating a European HabNet? // Creating European Corridors: method, data bases
- Integration of e. g. wilderness areas, (long distance) migration routes (incl. transhumans) as core areas for reestablishment of a functional eco network

Some selected R+D needs and results

- Re-establishment of habitat connectivity at coastlines (across ports and habour cities)
- minimal average grid densities for ecological corridors
- **Negotiations with the european states for a determination of the most important EU-Corridors: data base for habitats of European importance in consideration of Natura 2000 sites: a truly coherent Trans-European Nature Network and a Defragmentation Program**

What are eco-corridors - questions

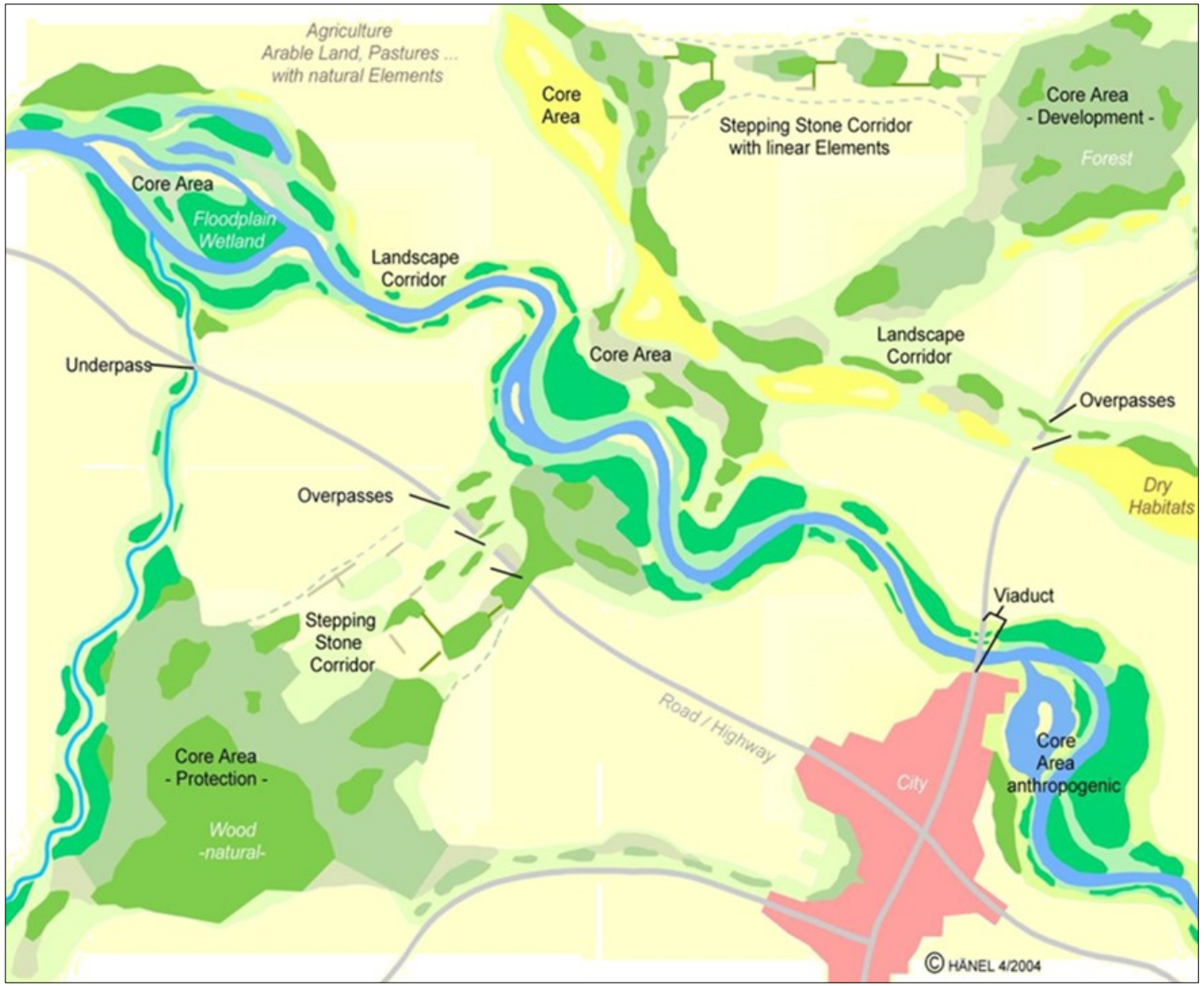
- How to detect and integrate pure migration corridors/areas
- How to cope with long-distance migration “LDM”
- Important (deer) paths and relevant scale
- 

  wilderness areas be integrated?↓

Long Distance Dispersal (LDD) and LDD by Vectors (LDDV); - defined according to different dispersal guilds? For larger mammals LDM: > 25 km ?, LDD: > 100 km ?; LDD for the smaller flightless fauna: ? LDDV ?

=> Scoping areas

Eco-corridor: core areas + landscape corridors, and/or stepping stone corridors and linear elements



KEY WORD: IMPACT INDICATORS // BEST INDICATORS

The related questions are:

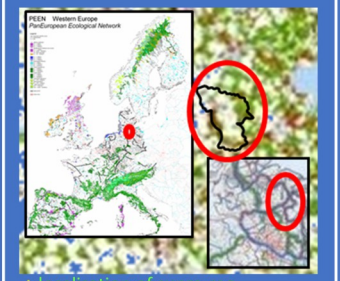
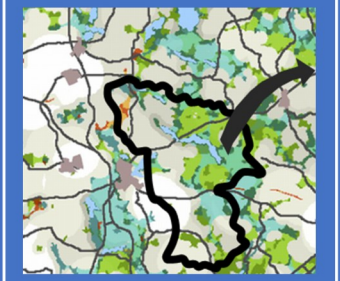
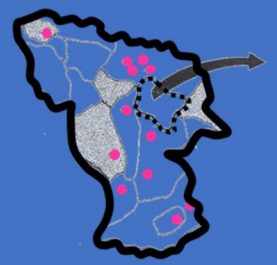
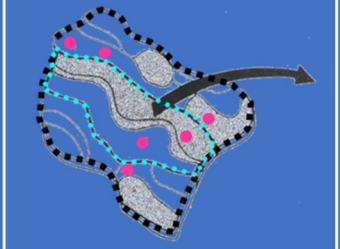
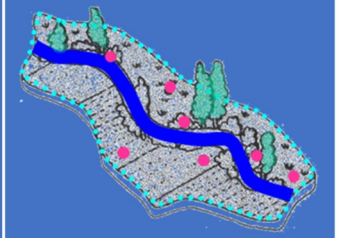
- Which indicator taxa (representing ecological guilds) should (amongst other indicators) be standard taxa for impact assessment in the different eco-regions?

- Which species would represent the European wide most important Eco-corridors and the most important demands on corridor quality (=”European target species list”)?

And (more general)

- *Are species and biotopes listed in the Annexes of the Habitats Directive representative for biodiversity affected by TI and especially for defragmentation needs?*

Planning scales

Scales for the assessment of - fragmentation, - defragmentation - habitat corridors along/across TI	≤ 1:300.000 SEA (TEN-T, …)	±1:200.000 SEA + EIA (NHP)	± 1:50.000 SEA + EIA	± 1.10.000 EIA, IA of SAC	≥ 1: 5.000 impact regulation compens. balance
	 + localisation of supra-reg. important conflict pts.	 + regional important conflict points	 + important fauna passages	 + necessary defragmentation	 + avoidance/mitigation/compensate

Existing plans or data *versus* Original field surveys

Small scale analysis
Priority is on plans for green infrastructure and project-specific interpretation of landscape features

Larger scales:
Priority is on project-specific field survey regarding species
(further information and specification of green infrastructure plans)

Impact of EDM on TI planning * = currently based on national concepts that represent incoherent ecological approaches	Very high and to be used in context with Sites of Community Importance/ SCIs and other strictly protected areas	High but in need to be supplemented by existing or special developed regional eco-corridors	In need to be supplemented by existing or special developed local eco-corridors	… to be supplemented by TI project-specific, parity reconnection concepts */**	… to be supplemented by TI project-specific, parity reconnection concepts*/ **
Further supplements in need (regarding ecological corridors and its function) **Additionally req. info**	International + national migration corridors of migrating species … See add. indicator slides	+ regional migration corridors of species See add. indicator slides	+ road- & railkill hotspots See add. indicator slides	+ main game trails and amphibian or reptile migration paths See add. indicator slides	See add. indicator slides
R&D needs concerning corridor maps and defragmentation priorities	e.g. European-wide methods to identify best corridors , based on habitat topology; criteria for prioritization.	e. g. methods (remote sensing, artificial intelligence) to identify best habitat corridors; methods to detect regional migration corridors, …	e. g. methods for monitoring rail- and roadkill hotspots	* at the level of project approval an equal reconnection concept can in most cases lead to efficient safeguarding of biological diversity despite the intervention	** standard methods (minimum requirements) for the development of project specific but cross-sectional reconnection concepts must be developed

Best indicators:

Principle; Contents see tables

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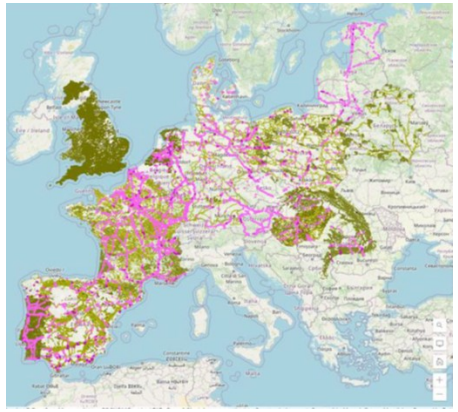
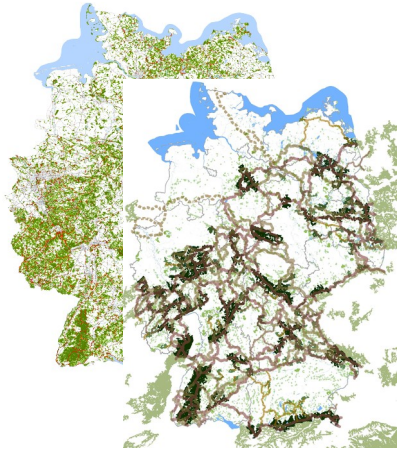
Use of the Map (web)

illustrated using the example of deriving a necessary ecoduct (1)
Possibilities and limitations of the map



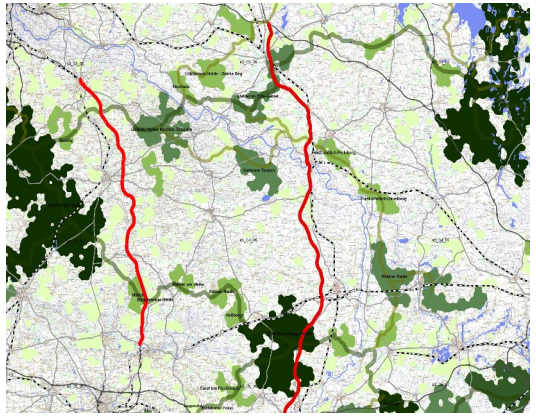
Information on EU-scale (scale 1:5,000,000):
Overview of the degree of fragmentation of TEN-G caused by TEN-T,
Additional information: Supra regional important ecological corridors.
Here: the Carpathian corridor
see: 3.2.4.2 Scale-related indicators and the role of the EDM



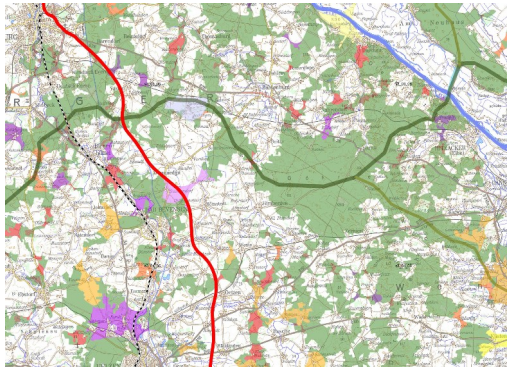
Information on national scale (scale 1:250,000):
Eco-corridors, e. g. based on a system of protected areas and habitat configuration (topology) and land use and/or
migration routes of migratory species e.g. large herbivore species
See: 3.2.4.3 Scale related indicator taxa and indicator species for barrier assessment and for defragmentation plans

Use of the Map (web)

illustrated using the example of deriving a necessary ecoduct (1)
Possibilities and limitations of the map



Information on regional scale (scale 1:50,000):
Maps of valuable habitats or mapping of habitat types, regional migration corridors of species (e.g. wolf, lynx) and road and railkill hotspots and special corridors (e. g. transhumance)



Information on local scale (scale 1: 10.000):
Project specific selected areas for e. g. breeding birds or other indicators, e.g. ground beetles,
main game trails and amphibian paths and/or reptile migration paths,
main deer path, bat migration routes, road and railkill hotspots,
also taking in account avoidability and compensatability,
create a Parity defragmentation concept,
see 3.5.1 Parity reconnection ...

Use of the Map (web)

illustrated using the example of deriving a necessary ecoduct (3)
Possibilities and limitations of the map

Information on local scale (scale 1:5,000):
Detailed project-specific field surveys, e.g. locations of small-scale migratory movements,
Minimum requirements for the development of project specific but cross – sectional reconnection concepts
type, location, efficiency and sustainability of avoidance and mitigation measures and respective monitoring requierements
See: 3.5.2 Needs for Fauna Passages: Seven rules …, Thresholds for the dimension and for the maximum distances of fauna passages …

Information on site: creation of sites on ecoducts, the surrounding area, hinterland connection
See: 3.3.1 Verges as habitats and corridors,
3.4.3 Curbs, protection walls, fences and co as barrieres

PARITY RECONNECTION (DEFRAGMENTATION) PLANS

AS OBLIGATORY COMPONENT OF TI DEVELOPMENT

Existent biotope network planning **at the supra-regional level** usually only needs to be adapted locally when new TI is developed. The large-scale ecological relationships remain in place.

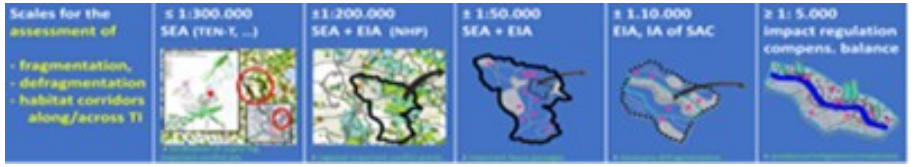
At the regional and local level, things are different:
On regional and local level expansion or new installation of TI can alter both habitat topology and connectivity in a way that reformation of habitat networks is necessary on the one hand – and, on the other hand, the improvement of habitat networks and connectivity is the most efficient compensation measure.

Therefore we propose the requirement that parity reconnection (defragmentation) should be an obligatory component of TI-development, and that guidelines for such an approach are needed.

Planning guidelines for Pan European Defragmentation

meeting both **EU-wide requirements** and **regional differences**

Development of **planning tools** (criteria and indicators) for **recording** and **evaluating** fragmentation effects and of **principles** for **preventing** and **compensating** fragmentation



Indicators and rules for assessment procedures at different scales and related possibilites and measures for the avoidance of impacts

- Aimed minimal average densities for ecological corridors
- Thresholds for (a) minimum distances and (b) the size of fauna passages at strong barriers
- Guidelines for bundling of transport infrastructures
- Guidelines for bundling of transport infrastructures and photovoltaic plans
- Corridors for life: integrated TIH as habitat corridors
- Parity reconnection plans

Related R+D needs and most consquential deficits of assessment procedures

MOST CONSEQUENTIAL DEFICITS OF ASSESSMENT PROCEDURES – A SELECTION

Inappropriate definition of the impact areas for fragmenta… …t (scoping)

Inappropriate selection of impact indicators (besi…
small fauna (and therefore the main share of s…
neglecting (the demands of) large herbivores (…
listed as endangered while concentrating on st…
(unbalanced prioritization of Annex IV and Annex…

Neglecting the various concepts, maps and plans for ec…
Thresholds for (a) distances and (b) size of fauna passages at …

Neglecting: - negative bundling effects of TI
- Mitigation and Compensation with no regard to the next bordering TI
- the opportunity for parity GI planning
- the role of verges and side areas as habitats and (possibly) Ecol. corridors

Addition from the Workshops:

Inappropriate or no consideration of expected environmental changes such as range expansions of bears or red deer or, for example, more pronounced annual fluctuations in precipitation or drought periods.

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Deliverable 5.3 see https://bison-transport.eu/deliverables/

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UNIKASSEL VERSITÄT ARCHITECTURE URBAN PLANNING LANDSCAPE PLANNING

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