

European Environment Agency



## Nature Restoration Law & new EU Forest Strategy

*Assessment of Carpathian forest  
connectivity and prioritisation  
for conservation / restoration*

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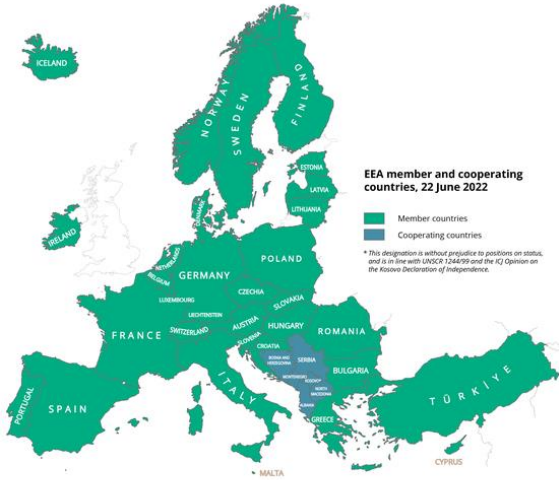
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Dr. Ana Marin Guerrero, EEA/ETC DI

**8<sup>th</sup> Meeting of the Carpathian Convention Working Groups  
on Sustainable Forest Management**  
10-12 October 2022, Levice, Slovakia



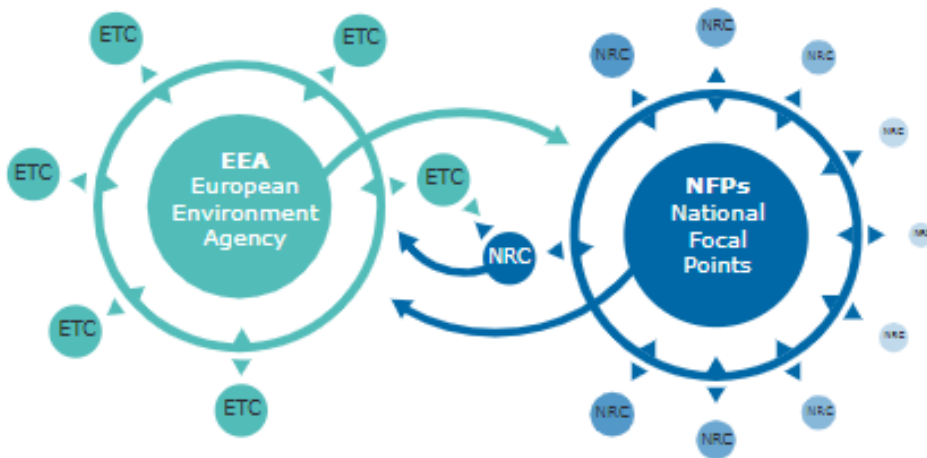
# Delivering data and knowledge to achieve Europe's vision on climate and environment



The European Environment Agency collects data and information from an extensive network.



- [European environment information and observation network \(Eionet\)](#)



## How we will work: Strategic Objectives

### SO1 Supporting policy implementation and sustainability transitions

Produce evidence-based knowledge to support policy implementation and development of new initiatives to accelerate and scale up the transition to sustainability.

### SO2 Providing timely input to solutions for sustainability challenges

Deliver targeted inputs to inform policy and public discussions, by organising and communicating knowledge on responses, including innovative solutions to societal challenges.

### SO3 Building stronger networks and partnerships

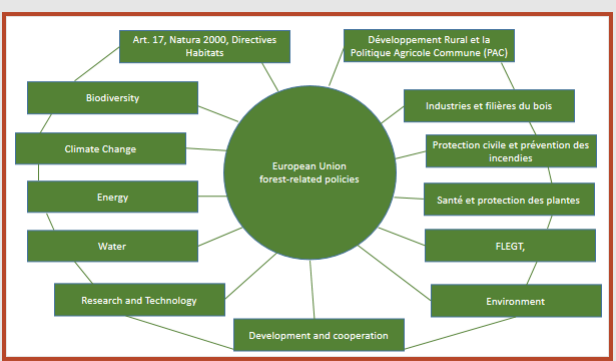
Strengthen our network through more active engagement at the country level and work with other leading organisations in order to facilitate the sharing of knowledge and expertise.

### SO4 Making full use of the potential of data, technology and digitalisation

Embrace digitalisation, including new technologies, big data, artificial intelligence and earth observation that will complement and potentially replace established information sources to better support decision making.

### SO5 Resourcing our shared ambitions

Develop structures, expertise and capacity across our network to meet evolving knowledge needs, securing and diversifying the resources needed to achieve our joint vision.



# Green Deal

Biodiversity Strategy for 2030

Fit for 55' package

Forest Strategy for 2030

Nature Restoration Law

FISE

3 billion tree pledge

Roadmap for the 3 billion trees

EU Framework on Forest Monitoring and Strategic Plans

....

# Bringing back nature into our lives - Biodiversity strategy for 2030 and forests

- Protection commitments include protecting all remaining EU primary and old-growth forests, and further protection to build a truly coherent Trans-European Nature Network
- Increasing the quantity of forests and improving forest health and resilience are actions that are viewed to drive a joint agenda for achieving both biodiversity targets and climate neutrality.
- All public forests and an increased number of private forests should have management plans that include biodiversity-friendly afforestation and reforestation and closer-to-nature-forestry practices.



# EU Biodiversity Strategy for 2030

Ongoing harmonisation of definitions: primary and old growth forests  
(Working group on Forests and Nature)

- Primary forest according to the FAO definition
- Still under development for the OGFs

## EU biodiversity strategy: forest related actions



Establish protected areas for at least 30 % of land (forests?)



With stricter protection of the (primary and old growth forests) remaining

10 % strictly protected forests



# Measures, Responses and Solutions

Nature-based solutions

Regeneration

Protection

Sustainable management

Enablers

Legislation

Governance

Finance and investments

Knowledge

Research

Practices

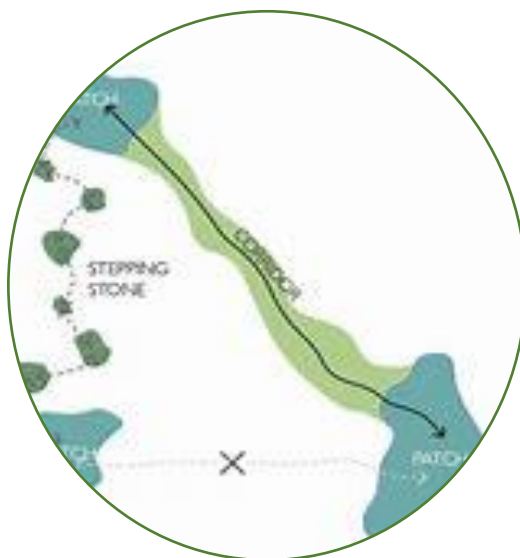
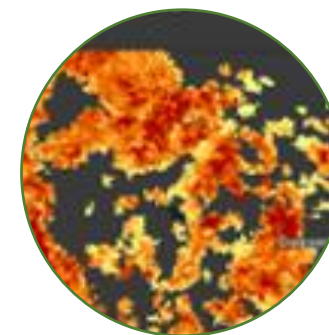
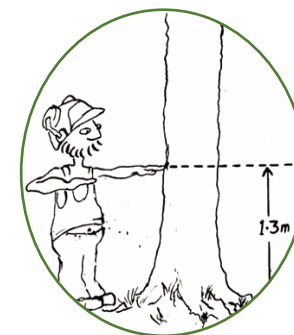
Tools

Monitoring

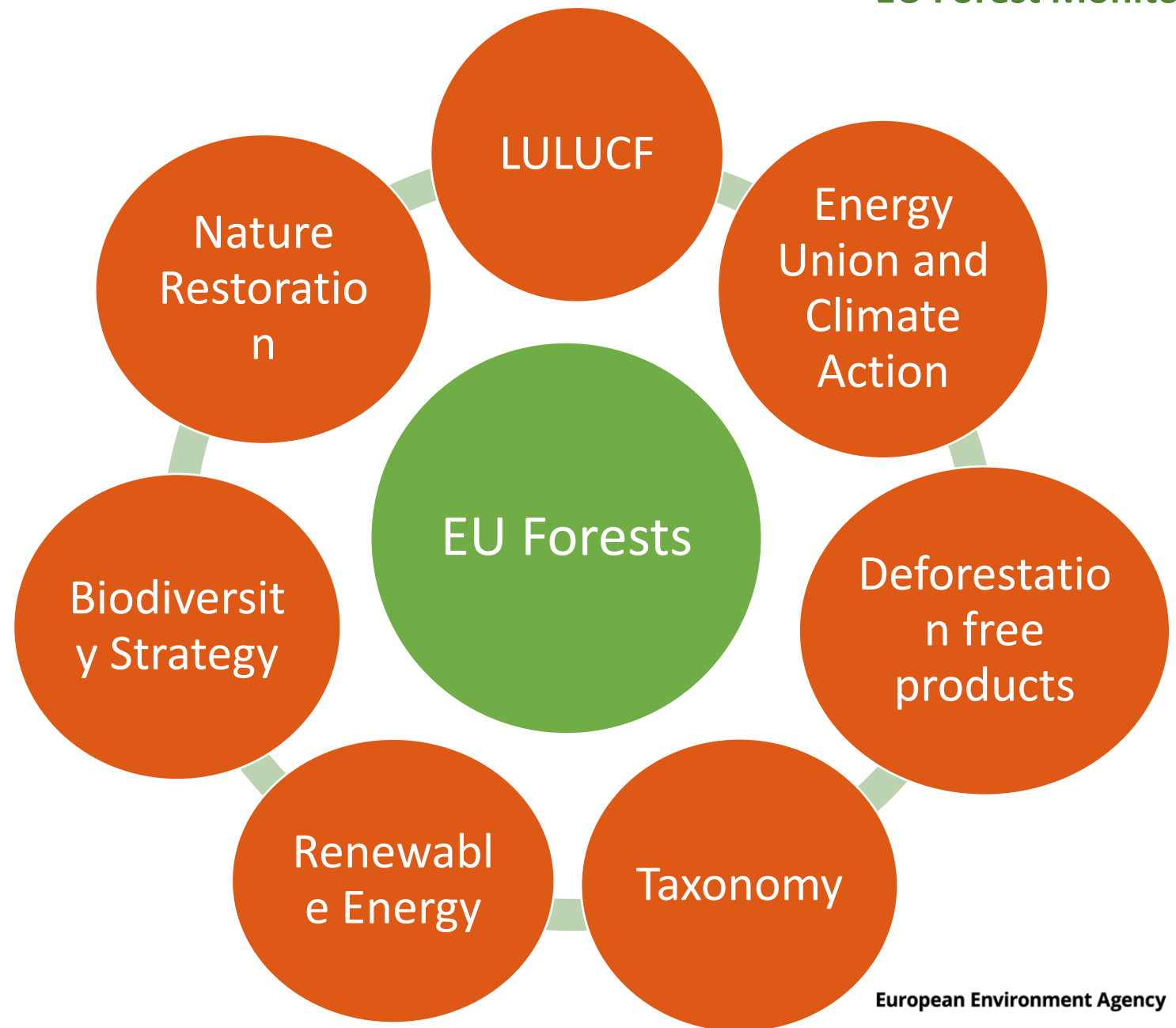
Networks and partnerships



- Indicators selected for monitoring forest ecosystem restoration (EU Nature Restoration Law)



- EU Framework for Forest Monitoring and Strategic plans
- Under development to monitor the achievement of climate, biodiversity, rural development and sustainable bio-economy objectives





# ASSESSMENT OF FOREST CONNECTIVITY AND PRIORITISATION FOR CONSERVATION / RESTORATION IN CARPATHIAN MOUNTAINS

*Outlining the method – DEMO*



# Outline – *Assessment of forest connectivity and prioritisation for conservation / restoration*

Define connectivity / fragmentation

*From functional or/and spatial perspective*

Define the area of interest

*Virgin forest, virgin and quasi-virgin forests, biodiversity priority areas, carbon-rich ecosystems,..... ?*

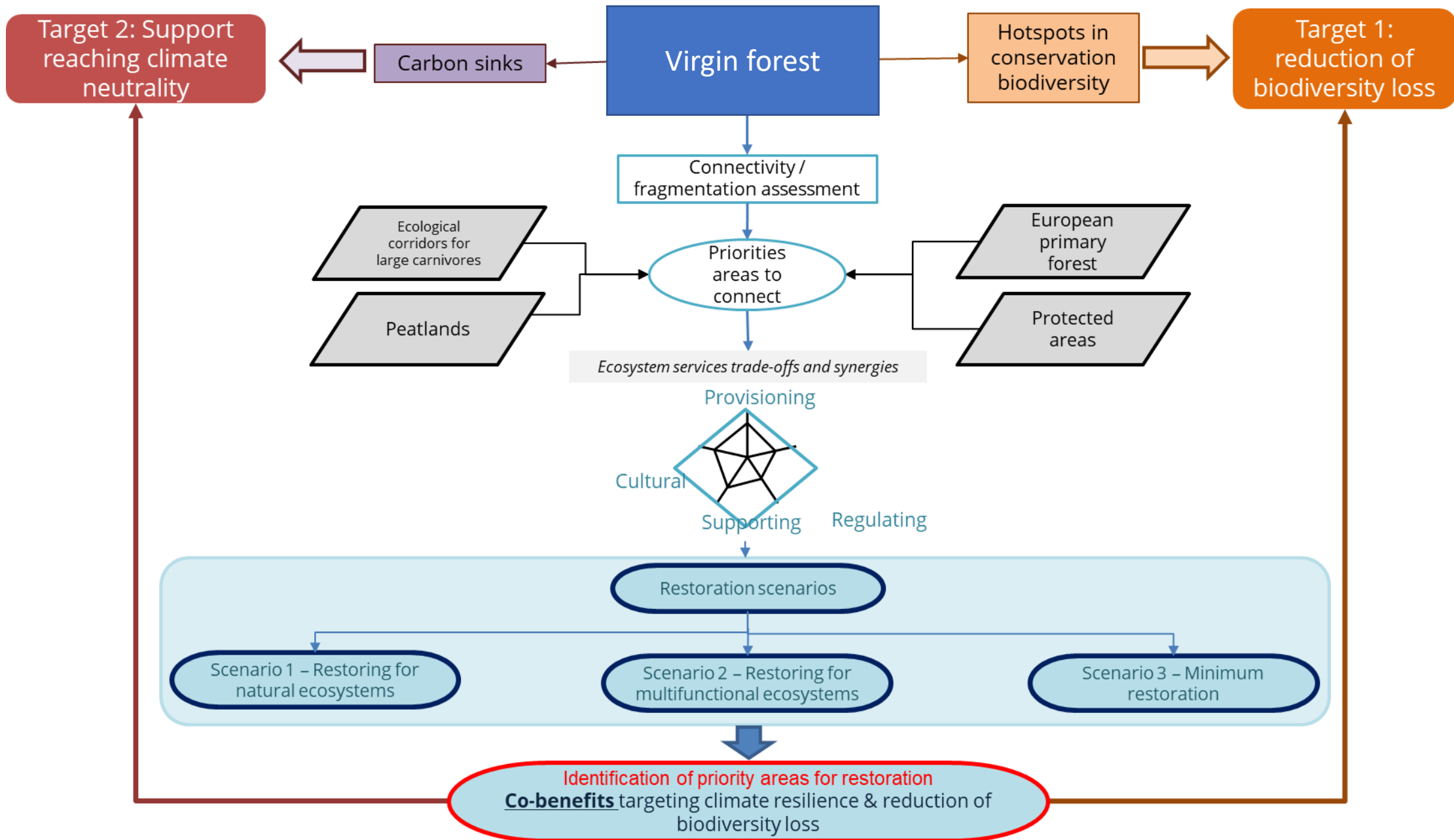
Assess the current connectivity

Model scenarios to improve the connectivity

Identification of priority areas to restore







***TESTING THE APPROACH***  
***Assessing connectivity***



## KEY CONCEPTS to apply connectivity assessment tools - Restoration planner GUIDOS-

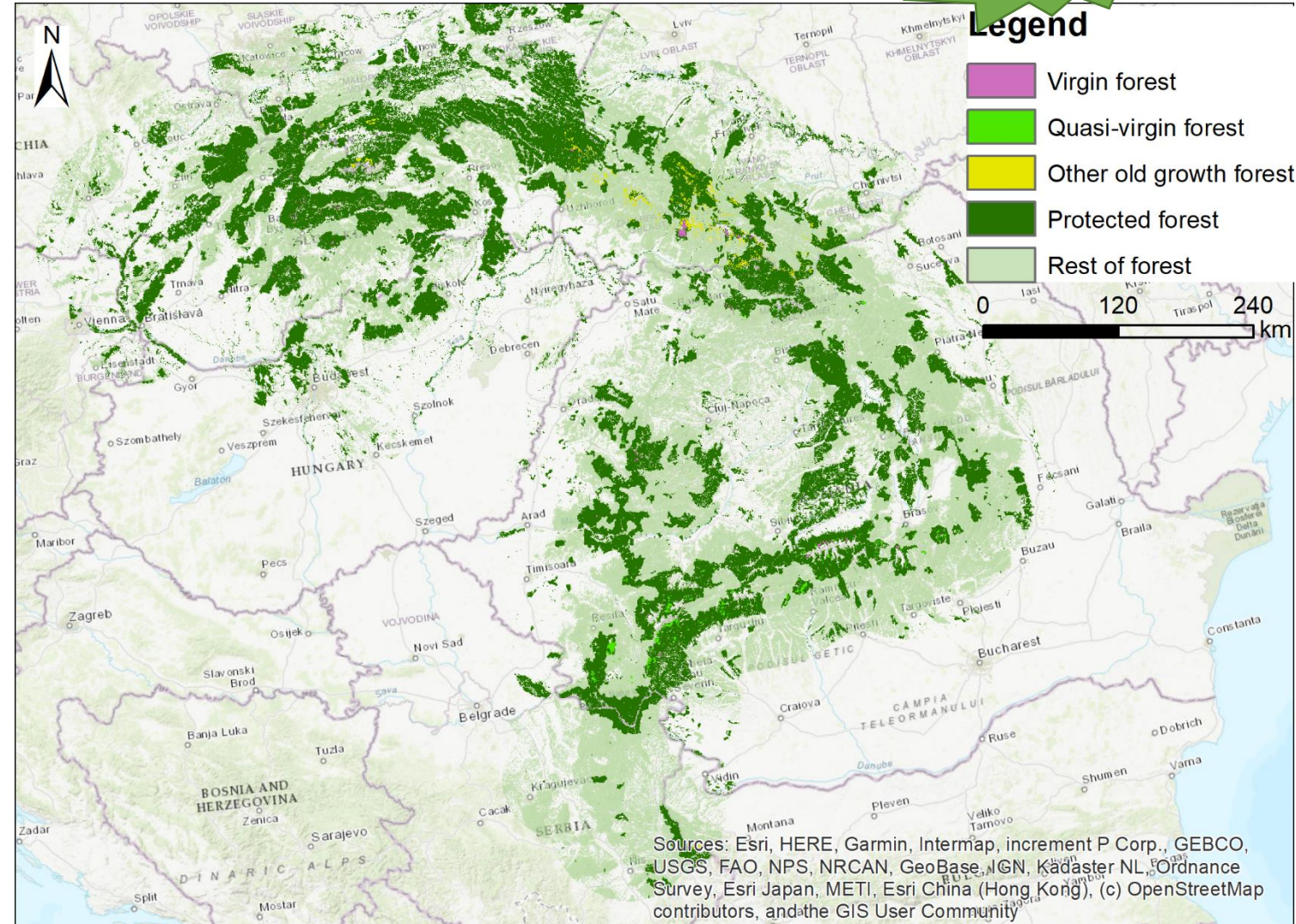
- 1) **Network of interest** → composed by land cover parcels, species habitats, or any other homogeneous area. This is the base area to reconnect. => Virgin forest and other old-growth forest
- 2) **Resistance map** for the non-network pixels → Difficulty to traverse/restore a given pixel [3 – 100 (max)]. This is key, driving the expense of a given restoration pathway or ultimately, the geographic location of cost-efficient restoration pathways, which will follow the path of least resistance.



# Key steps (1) Definition of NOI. Classify forest according to biodiversity/conservation value

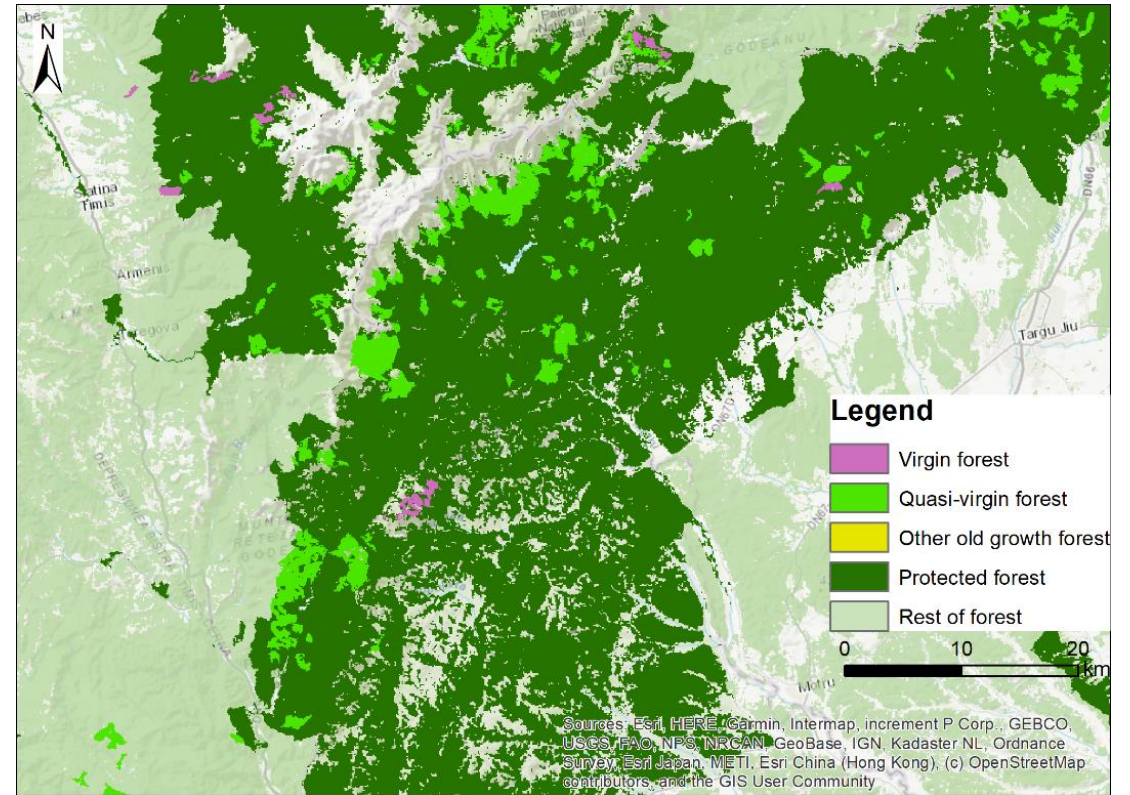
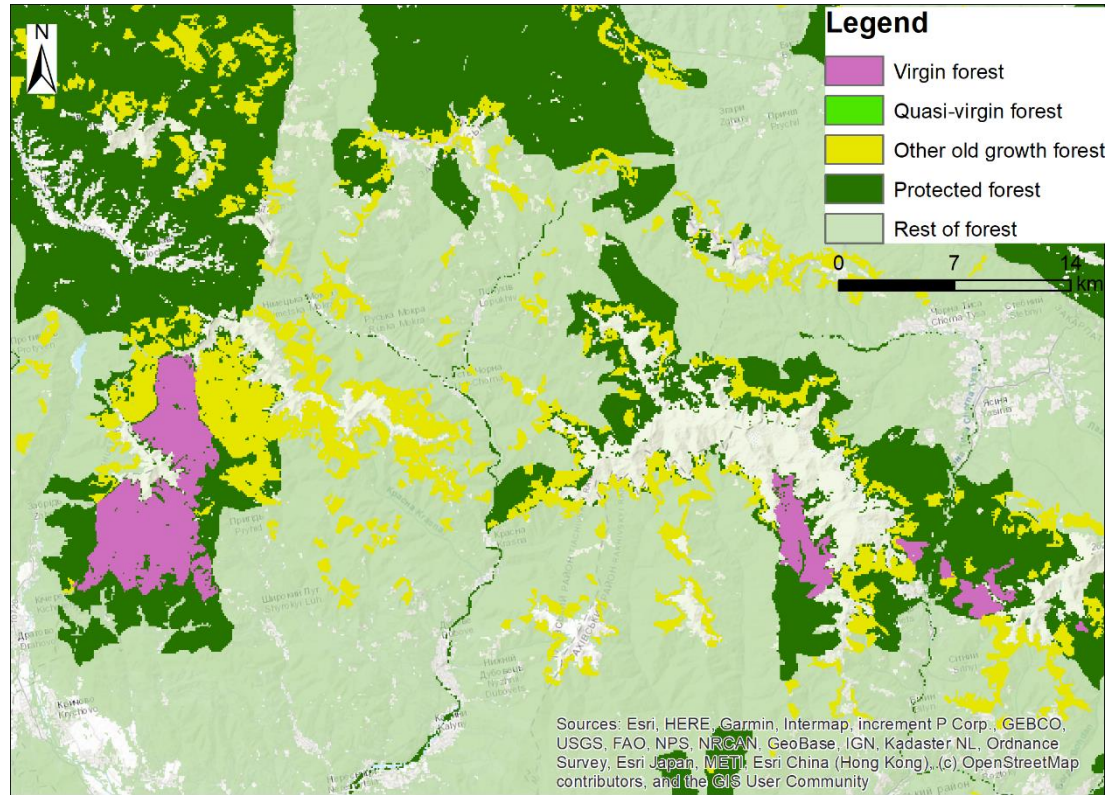
Test 1  
DEMO

1. VF and QF forest. Identification of polygons:
  1. VF & QVF + sabatini et al. 2021 polygons
  2. Refinement of VF and QF areas by overlapping with forest cover map –> to update the area and remove potential clear-cut areas
2. Other old growth forest ← records from Sabatini et al. database that do not overlap with CC VF & QVF plots (refinement by forest land cover)
3. Protected forests not included in previous classes → (PA + forest land cover) [https://www.protectedplanet.net/en/search-areas?search\\_term=poland&geo\\_type=country](https://www.protectedplanet.net/en/search-areas?search_term=poland&geo_type=country)





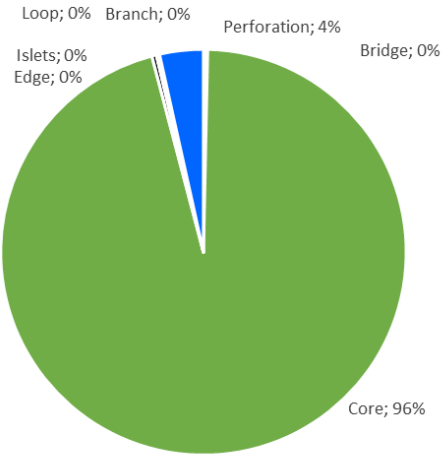
# Key steps (1) Classify forest to define the network



Test 1  
DEMO

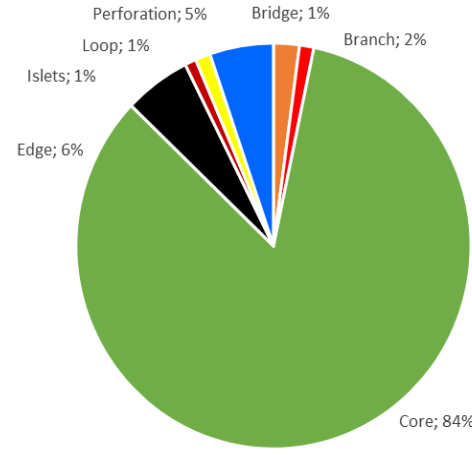
# Morphological Spatial Pattern Analysis (MSPA) of forest network

MSPA - Virgin Forest



Branch Bridge Core Edge Islets Loop Perforation

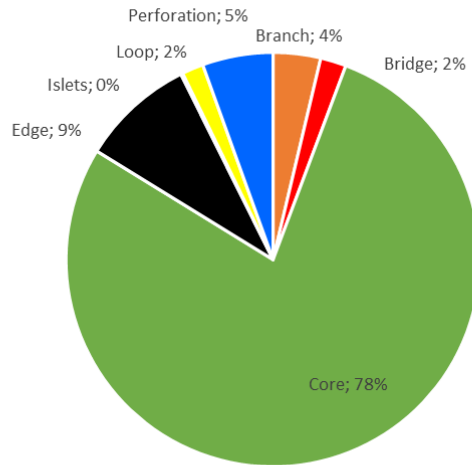
MSPA - Protected forest



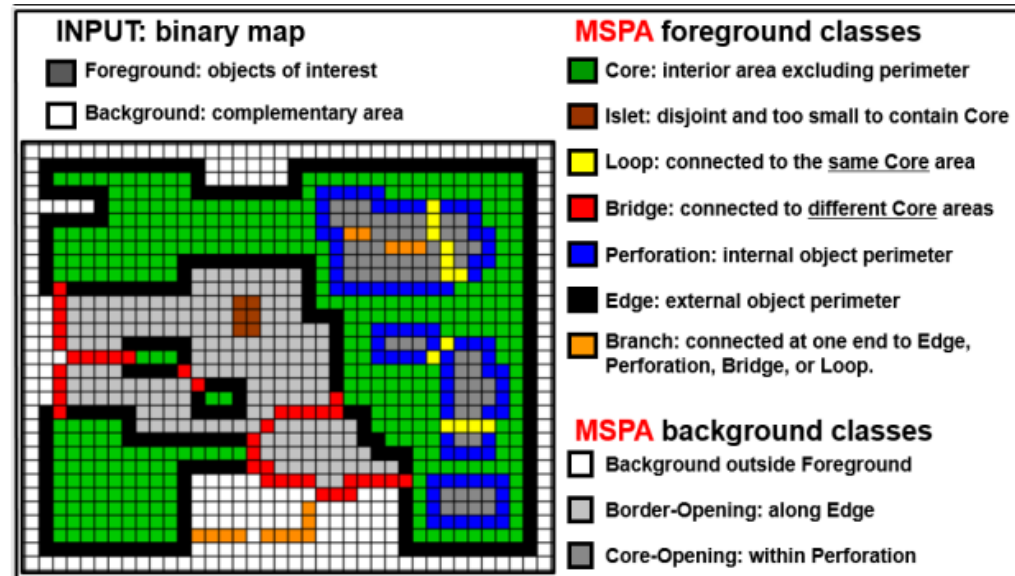
Branch Bridge Core Edge Islets Loop Perforation

- Virgin forests are the inner part of forest patches. No edges
- The protection of the forest ensures better integrity of forest (higher percentage of core) but lower than virgin forest

MSPA - Forest



Branch Bridge Core Edge Islets Loop Perforation





# Build-up the resistance map

Test 1  
DEMO

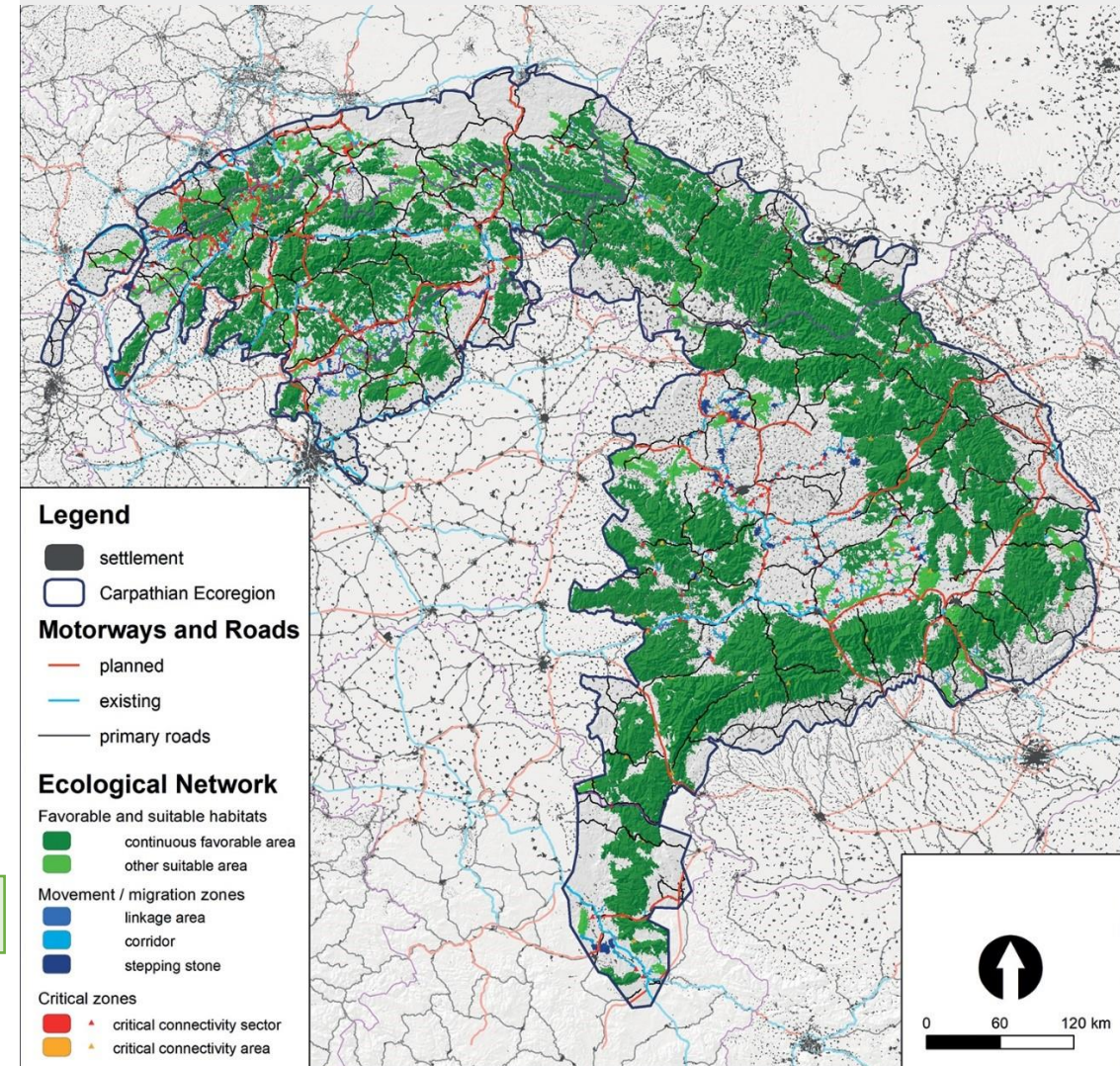
## Restoration scenarios/connection paths

Components of resistance map:

1. Land cover & land use **SIMPLEST TEST**
2. Natural and seminatural protected ecosystems (excluding forest that is in the network)
3. Forests out of NOI (non-protected and non classified as old-growth forest)
4. Wetlands - Protected wetlands / non-protected
5. ConnectGREEN output
6. Former wetlands (peatlands)
7. Ownership
8. ??

How to score the resistance value? ← Based on ES tradeoff

### ConnectGREEN project



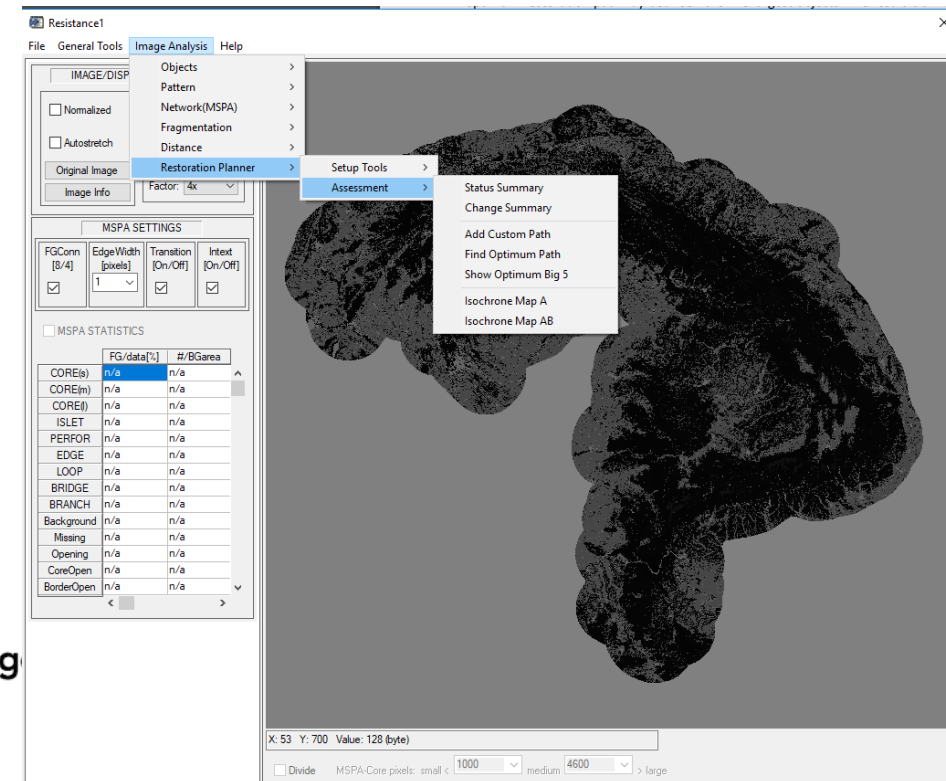


# Test 1: Show optimum BIG 5 .Land cover + Forest well conserved

Test 1  
DEMO

Area characteristic	Resistance value *
Virgin forest	2
Quasi-virgin forest	2
Other old growth forest	2
Protected forest (non in previous classes)	2
Forest	4
Shrubs	15
Herbaceous vegetation	15
Herbaceous wetland	6
Moss and lichen	7
Bare / sparse vegetation	60
Cultivated and managed	70
Urban / build	100
Permanent water bodies	100

OPTIMUM big 5: This option will calculate the pairwise optimum pathway between the five largest objects on a restoration-compliant resistance image.



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\*Resistance values assigned for testing the method. Non consolidated criteria behind

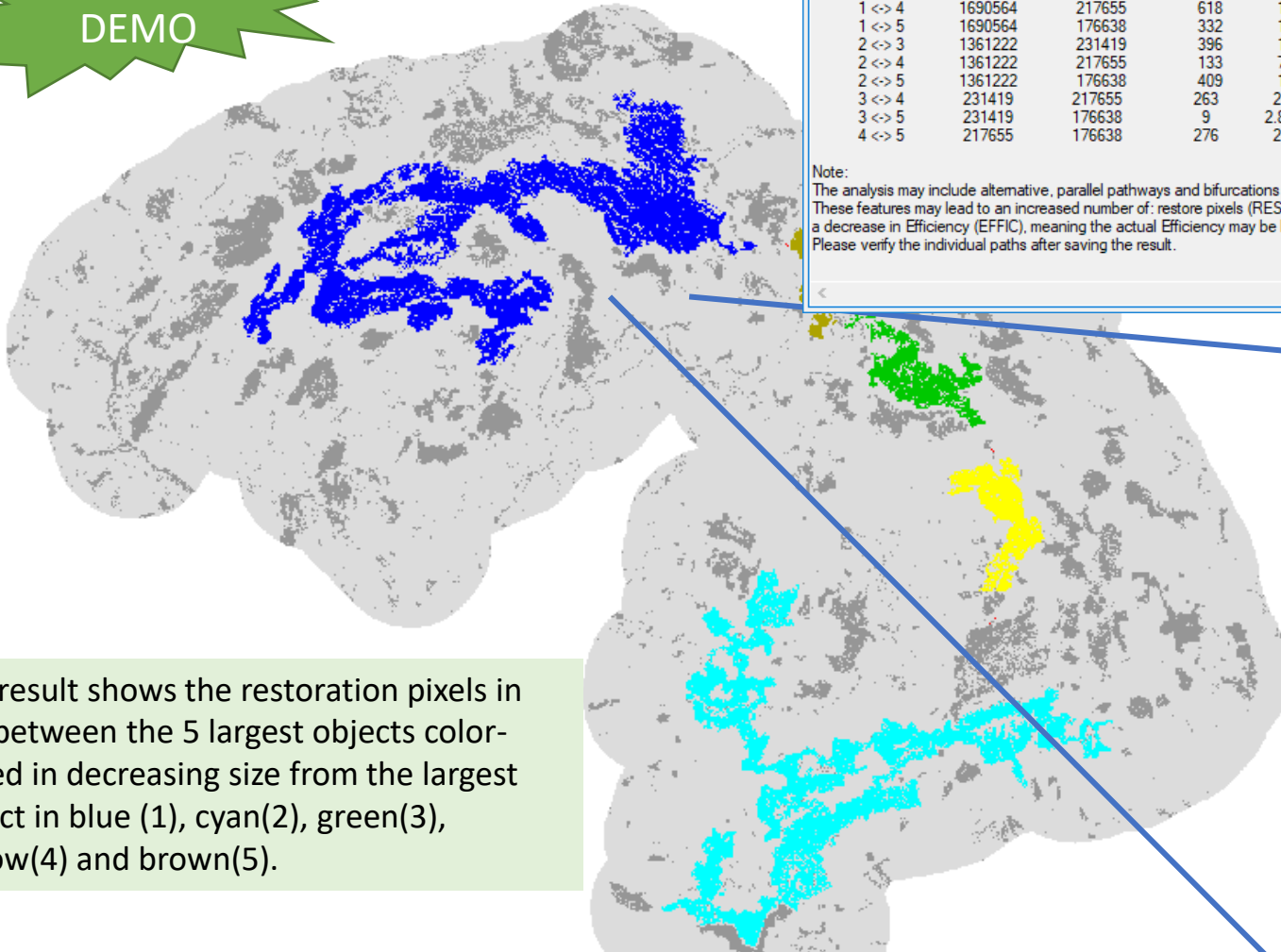
Test 1  
DEMO

Restoration Planner, BG-resistance: var%

### SCENARIO MODELING

File	RESTORE	SIZE_A	SIZE_B	REST_PIX	AVDIST_RP	EXP_var	EFFIC	ECA_ORIG	ECA_NEW	DELTA_ECA	COH_ORIG	COH_NEW	DELTA_COH
	1 <> 2	1690564	1361222	751	16.4090	3191	526.58016	2235989.7	3916306.9	1680317.3	29.107608	50.976614	21.8690
	1 <> 3	1690564	231419	351	16.1545	1404	257.59599	2235989.7	2597654.4	361664.77	29.107608	33.814133	4.70653
	1 <> 4	1690564	217655	618	18.2575	2472	218.74439	2235989.7	2776725.8	540736.13	29.107608	36.143880	7.03627
	1 <> 5	1690564	176638	332	16.9152	1328	137.84924	2235989.7	2419053.5	183063.80	29.107608	31.489330	2.38172
	2 <> 3	1361222	231419	396	16.7857	1771	219.34379	2235989.7	2624447.5	388457.86	29.107608	34.162703	5.05510
	2 <> 4	1361222	217655	133	7.82011	719	317.49407	2235989.7	2464267.9	228278.24	29.107608	32.078727	2.97112
	2 <> 5	1361222	176638	409	16.3299	1823	283.82599	2235989.7	2753404.4	517414.77	29.107608	35.841288	6.73368
	3 <> 4	231419	217655	263	21.3197	1052	22.064298	2235989.7	2259201.3	23211.641	29.107608	29.408765	0.301157
	3 <> 5	231419	176638	9	2.88562	36	505.92799	2235989.7	2254203.1	18213.408	29.107608	29.344671	0.237064
	4 <> 5	217655	176638	276	20.4307	1104	52.873765	2235989.7	2294362.3	58372.637	29.107608	29.866416	0.758809

Note:  
The analysis may include alternative, parallel pathways and bifurcations in the Background having the same isochrone value. These features may lead to an increased number of: restore pixels (REST\_PIX) and expense (EXP\_var), resulting in a decrease in Efficiency (EFFIC), meaning the actual Efficiency may be higher. Please verify the individual paths after saving the result.



The result shows the restoration pixels in red between the 5 largest objects color-coded in decreasing size from the largest object in blue (1), cyan(2), green(3), yellow(4) and brown(5).

- This is a demo to test tools for scenario modeling. This support the decision making
- Restoration scenarios setup requires the Scientifics backing → resistance dimensions and scores

## Concluding remarks

- ❑ The work tested under the CCS collaboration has been valuable for future monitoring of forest connectivity as requested for upcoming EU forest assessments (i.b. EU Nature Restoration Law)
- ❑ Needs to be operational at EU level by 2025/26 if the NRL and EU Framework for forest monitoring are agreed for implementation
- ❑ Budget cuts ahead for 2023, EEA considering how to prioritise and tackle these challenges to meet the legal requests as well as needs for protecting, restoring and maintaining sustainable management of our forests





# Thank you for your attention!

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