DaRe to Connect - Webinar

Training course for the user-friendly GIS Application

📅 12th November 2021, 13:05-14:00

WELCOME!

before we start, PLEASE...

1) *note, that this meeting will be RECORDED* 🔴
2) *during the presentations turn your CAM & MIC OFF*
3) *enter your NAME & EMAIL ADDRESS in the chat for the participant list!*

Thanks! ☺

Project co-funded by European Union funds (ERDF, IPA)

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📅 12th November 2021, 13:00-14:00

Supporting Danube Region's ecological Connectivity by linking Natura 2000 areas along the Green Belt

Project co-funded by European Union funds (ERDF, IPA)

Hands-on:
Showcasing the user-friendly GIS Tool

Featured Outputs of D2C   **Functions of the Tool**

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University of Vienna,
Dept. of Botany & Biodiversity Research

Sharing the findings

- **Activity 4.4:** Elaboration of the **user-friendly GIS tool** for using remote sensing data

D 4.4.1	*Deliverable description* Elaboration of a user-friendly, free GIS application-tool for using remote sensing data for the identification, assessment and monitoring of natural features (Natura 2000 habitats) and ecological corridors.
D 4.4.2	*Deliverable description* Online manual: Elaboration of an online manual how to use the developed GIS application-tool, the manual and the application tool will be available on PPs websites and by other relevant online media.
D 4.4.3	*Deliverable description* Training courses and reports: Implementation of training courses on the developed GIS application tool to improve capacities of public bodies and relevant NGOs in pilot regions.
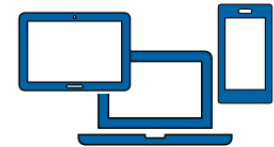
Interconnected Green Belt (WP3)

- **Objectives:**
  - **Enhancement of connectivity** of Natura 2000-areas along the Green Belt in the Danube Region (corridor of 50 km)
  - **Identification of suitable ecological corridors** between and **areas for the improvement** of connectivity of protected areas
 - **Analysis of suitable** transnational ecological **corridors**
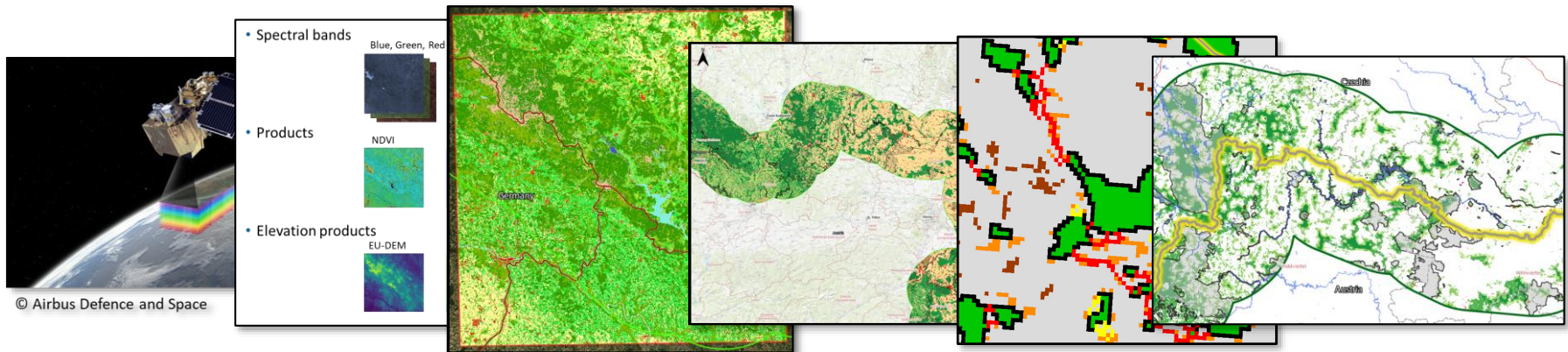
Interconnected Green Belt (WP3)

- **Outputs:**

Available Results	Pilot Regions*	European Green Belt
Data Source	Sentinel-2 Satellite Data	EUNIS Habitat Classification
Pixel Resolution	10m	100m
Broader Habitat Types (BHT)	✔	✔
Ecosystem Services (ESS)	✔	✔
Morphological Spatial Pattern Analysis (MSPA)	✔	✔
Euclidean Distance	✔	✔
Connectivity-Functionality Index (CFI)	✘	✔

*Sentinel-2 data analysis was conducted for Pilot Regions 1, 3, 4 & 5)
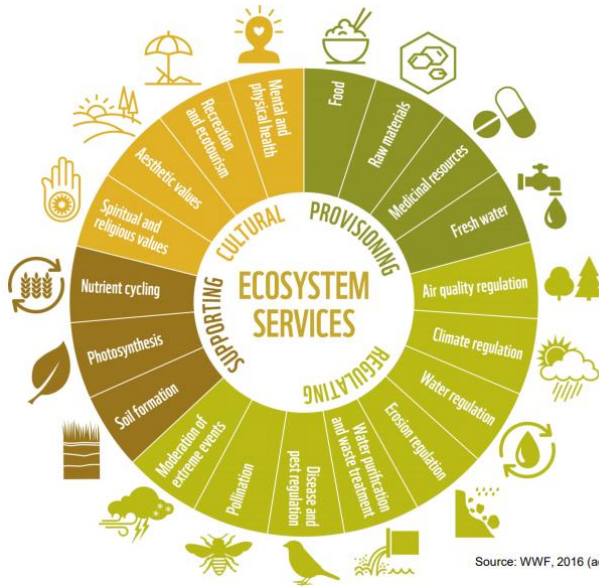
Broader Habitat Types (BHT)

- Classification system for **natural and anthropogenic land cover types** (according to BUNCE et al. 2008, 2011)

- e.g. bogs, rivers and streams, different kind of grasslands and woodlands etc.

- Elaborated for 4 of the 6 **Pilot Regions** (Sentinel-2) and the **whole EGB** (EUNIS habitat class.)

- **Basis for further analyses**, assessment and monitoring
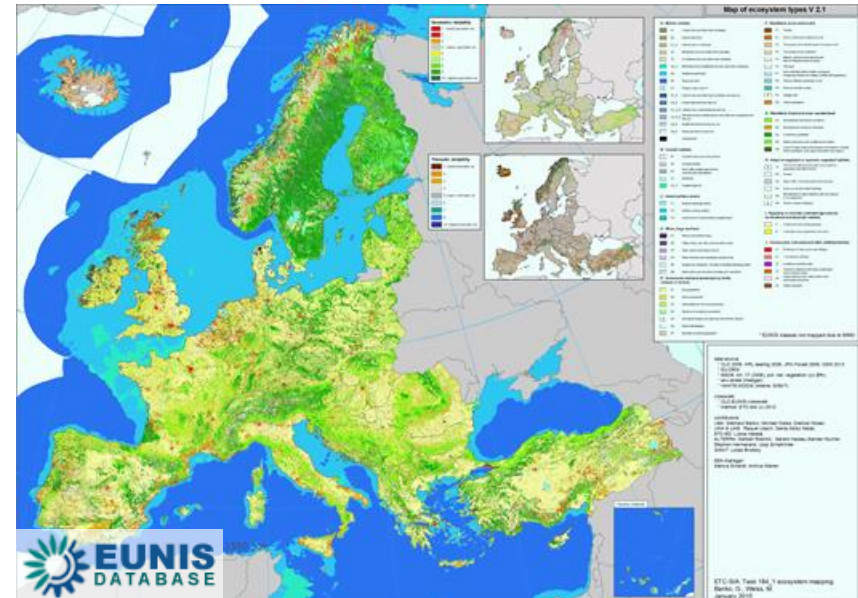
Ecosystem Services (ESS)

- all goods and services that **landscapes provide for sustaining life** as well as **benefits for human well-being**

- includes **potentials, materials and processes of the nature** (e.g. raw materials, biomass, biodiversity etc.)

Source: WWF, 2016 (adapted from Millennium Ecosystem Assessment, 2005)

- services of man-made **cultural elements and constructions** (e.g. agriculture, buildings, infrastructure, etc.)

- **Capacity matrix** assigns values (0-5) to the Broader Habitat Types for each ESS

Ecosystem Services (ESS)

BHT Code	BHT_Name	CLC Code	CLC description	Regulation functions	Gas regulation	Climate regulation	Disturbance prevention	Water regulation	Water supply	Soil retention	Soil formation	Nutrient regulation	Waste treatment	Pollination	Biological control	Habitat functions	Refugium function	Nursery function	Production functions	Food	Raw materials	Genetic resources	Medicinal resources	Ornamental resources	Information functions	Aesthetic information	Recreation	Cultural and artistic information	Spiritual and historic information	Science and education	Carrier functions	Habitation	Cultivation	Energy-conversion	Mining	Waste disposal	Transportation	Tourism-facilities	Total Function Value
C1	Inland surface waters – standing	512	Water bodies	3	2	4	3	4	5	3	4	3	5	0	3	5	5	5	3	3	2	5	3	3	5	4	5	4	5	5	1	0	0	3	0	0	3	3	69
C2	Inland surface waters – watercourses	511	Water courses	3	2	4	3	4	5	2	1	3	5	0	3	5	5	5	3	3	2	5	3	4	5	5	5	4	5	5	1	0	0	4	0	0	3	3	70
C3	Litoral zone of inland waterbodies	411	Inland marshes	4	4	4	4	5	5	4	5	4	5	2	1	5	5	5	3	1	2	5	4	2	4	4	4	2	4	5	0	0	0	0	1	0	0	1	63
C3/E5	Wetlands with reed, tall herbs	411	Inland marshes	4	4	4	4	5	5	4	5	4	5	2	1	5	5	5	3	1	2	5	4	2	4	4	4	2	4	5	0	0	0	0	1	0	0	1	63
D	Mires, bogs and fens	412	Peat bogs	4	4	5	3	4	4	5	5	4	4	1	3	5	5	4	2	0	4	4	3	1	4	4	4	2	4	4	1	0	0	2	2	0	0	1	60
E1	Dry grasslands	321	Natural grasslands	4	3	3	3	4	4	5	5	4	3	4	4	5	5	5	3	2	1	5	3	4	5	5	5	4	4	5	0	0	1	0	0	0	0	1	67
E2a	Mesic grassland, intensively managed	231	Pastures	3	1	3	1	3	1	4	4	2	3	3	3	4	4	3	3	5	2	3	3	1	3	4	4	3	1	3	1	0	5	0	0	0	0	1	51
E2b	Mesic grassland, medium intensive	321	Natural grasslands	4	3	3	3	4	4	5	5	4	3	4	4	5	5	5	3	2	1	5	3	4	5	5	5	4	4	5	0	0	1	0	0	0	0	1	67
E2c	Mesic grassland, unmanaged	321	Natural grasslands	4	3	3	3	4	4	5	5	4	3	4	4	5	5	5	3	2	1	5	3	4	5	5	5	4	4	5	0	0	1	0	0	0	0	1	67
E3	Seasonally wet and wet grasslands	321	Natural grasslands	4	3	3	3	4	4	5	5	4	3	4	4	5	5	5	3	2	1	5	3	4	5	5	5	4	4	5	0	0	1	0	0	0	0	1	67
E5	Woodland fringes and clearings and tall forb stands	324	Transitional woodland-shrub	4	3	4	4	3	4	5	5	4	3	4	4	5	5	5	3	2	3	4	3	3	4	4	4	3	2	5	0	0	1	0	0	0	0	0	63
E7	Sparsely wooded grasslands	244	Agro-forestry areas	3	3	4	1	4	3	4	4	2	3	3	2	4	4	3	3	3	5	3	3	3	3	2	3	3	2	3	1	0	3	3	0	0	0	1	54
F3.1	Temperate thickets and scrub	322	Moors and heathland	4	3	4	4	4	4	5	5	4	3	3	4	5	5	5	3	2	3	5	3	4	5	5	5	4	4	5	0	0	0	1	0	0	0	1	69
F4.2	Dry heaths	322	Moors and heathland	4	3	4	4	4	4	5	5	4	3	3	4	5	5	5	3	2	3	5	3	4	5	5	5	4	4	5	0	0	0	1	0	0	0	1	69
F9	Riverine and fen scrubs	322	Moors and heathland	4	3	4	4	4	4	5	5	4	3	3	4	5	5	5	3	2	3	5	3	4	5	5	5	4	4	5	0	0	0	1	0	0	0	1	69
FA	Hedgerows	231	Pastures	3	1	3	1	3	1	4	4	2	3	3	3	4	4	3	3	5	2	3	3	1	3	4	4	3	1	3	1	0	5	0	0	0	0	1	51
G1	Broadleaved deciduous woodland	311	Broad-leaved forest	5	5	5	5	5	5	5	5	4	4	5	5	5	5	5	5	3	5	5	5	5	5	5	5	4	5	5	1	0	1	1	0	0	0	2	79
G1.D	Fruit and nut tree orchards	222	Fruit trees and berry plantations	3	2	3	2	3	1	2	3	2	2	5	3	2	2	1	2	5	2	2	2	1	3	3	3	3	2	2	1	0	5	0	0	0	0	1	40
G3	Coniferous woodland	312	Coniferous forest	5	5	5	4	4	5	5	5	5	4	4	5	5	5	5	4	3	5	5	4	5	5	5	5	4	5	5	1	0	1	1	0	0	0	2	78
G4	Mixed deciduous and coniferous woodland	313	Mixed forest	5	5	5	4	5	5	5	5	4	4	5	5	5	5	5	4	3	5	5	4	5	5	5	5	4	5	5	1	0	1	1	0	0	0	2	77
G5.1/FA	Lines of trees or hedgerows	324	Transitional woodland-shrub	4	3	4	4	3	4	5	5	4	3	4	4	5	5	5	3	2	3	4	3	3	4	4	4	3	2	5	0	0	1	0	0	0	0	0	63
G5.8	Recently felled areas	324	Transitional woodland-shrub	4	3	4	4	3	4	5	5	4	3	4	4	5	5	5	3	2	3	4	3	3	4	4	4	3	2	5	0	0	1	0	0	0	0	0	63
H	Inland unvegetated or sparsely vegetated habitats	333	Sparsely vegetated areas	1	1	1	1	1	1	2	1	1	1	2	1	4	4	4	2	0	0	3	2	3	3	4	3	1	4	4	0	0	0	0	0	0	0	0	40
I1a	Arable land and market gardens – intensive	211	Non-irrigated arable land	1	1	3	1	3	0	1	2	1	1	1	2	2	2	2	2	5	2	2	1	1	1	2	1	3	0	1	1	0	5	0	0	0	0	0	31
I1b	Arable land and market gardens – low intensity	243	Land principally occupied by agriculture, with significant areas of natural vegetation	2	2	3	1	3	2	3	3	2	2	2	3	4	3	4	3	3	2	3	2	3	3	3	3	3	3	3	1	0	3	1	0	0	0	2	49
I2	Cultivated areas of gardens and parks	242	Complex cultivation patterns	2	1	3	1	3	1	2	3	1	2	2	3	3	3	2	2	4	2	1	2	1	2	2	3	3	2	2	1	1	4	0	0	0	0	1	39
J3	Extractive industrial sites	131	Mineral extraction sites	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	5	2	0	0	4
J4	Transport networks and other constructed hard-surfaced areas	122	Road and rail networks and associated land	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	1	1	1	0	0	1	0	0	0	0	0	5	2	8
J6	Waste deposits	132	Dump sites	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	5	0	0	3
Ja	Constructed, industrial and other artificial habitats – with significant green spaces	112	Discontinuous urban fabric	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	2	3	3	4	2	0	1	4	0	1	0	0	3	2	18
Jb	Constructed, industrial and other artificial habitats – high imperviousness	111	Continuous urban fabric	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3	3	4	2	0	2	5	0	1	0	0	3	2	16

Ecosystem Services (ESS)

TOTAL function value

= total <u>amount of capacity</u> of all landscape services

→ indicator for multifunctionality of GI and landscape elements
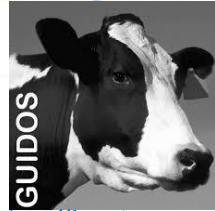
Σ Regulation services
Σ Habitat services
Σ Provision services
Σ Information services
Σ Carrier services
_____
= **TOTAL FUNCTIONAL VALUE**

Danube Transnational Programme

https://forest.jrc.ec.europa.eu/en/activities/lpa/gtb/

- **Morphological Spatial Pattern Analysis**

- describes the **geometry, connectivity & spatial arrangement** of image components (Vogt et al., 2007)

- Connectivity analysis for
  - all BHTs
  - specific habitat types (e.g. forests or extensive grassland)

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• **Morphological Spatial Pattern Analysis**

Example:
Connectivity analysis of broadleaved & coniferous forests

MSPA Components
- Core (green)
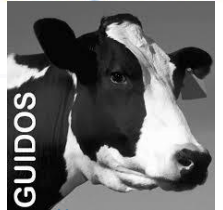- Islet (brown)
- Perforation (blue)
- Edge (black)
- Loop (yellow)
- Bridge (red)
- Branch (orange)
- Background (grey)

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DaRe to Connect

GUIDOS

• Morphological Spatial Pattern Analysis

Example:
Connectivity analysis of broadleaved & coniferous forests
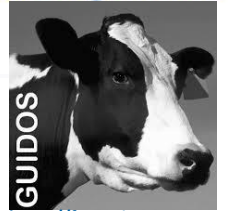
MSPA Components

- 🟩 Core
- 🟫 Islet
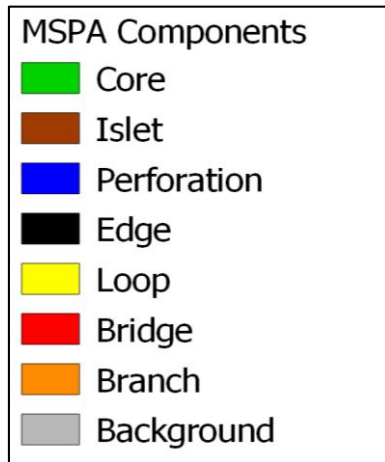- 🟦 Perforation
- ⬛ Edge
- 🟨 Loop
- 🟥 Bridge
- 🟧 Branch
- ⬜ Background
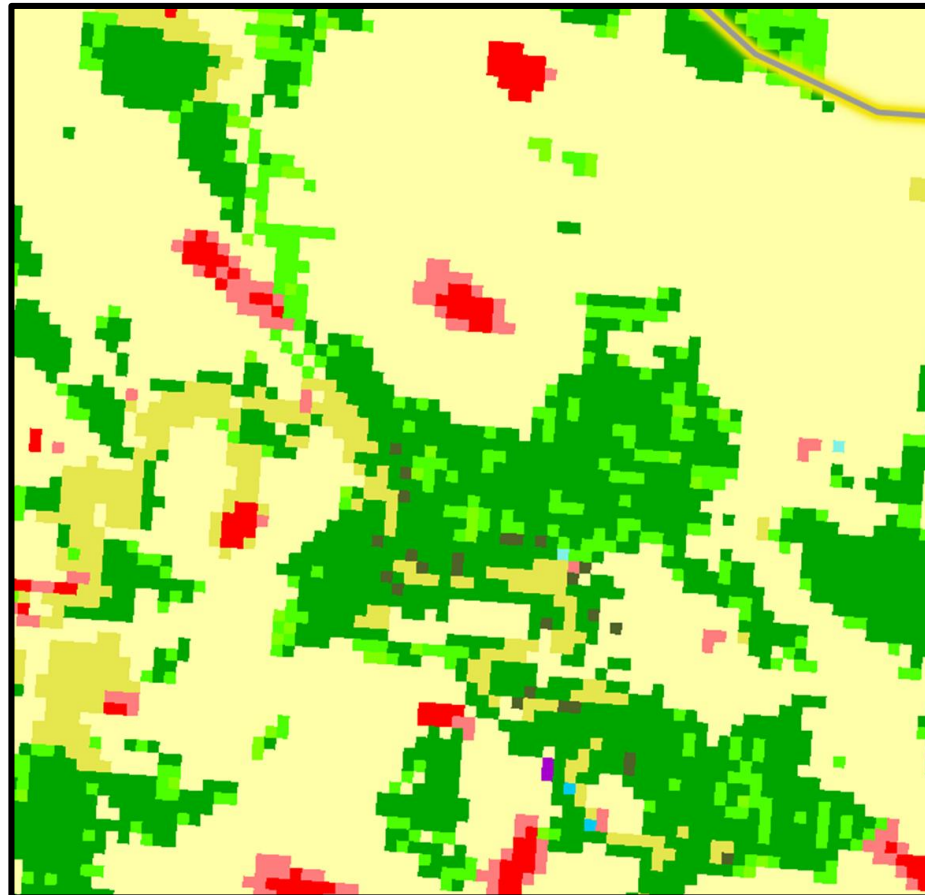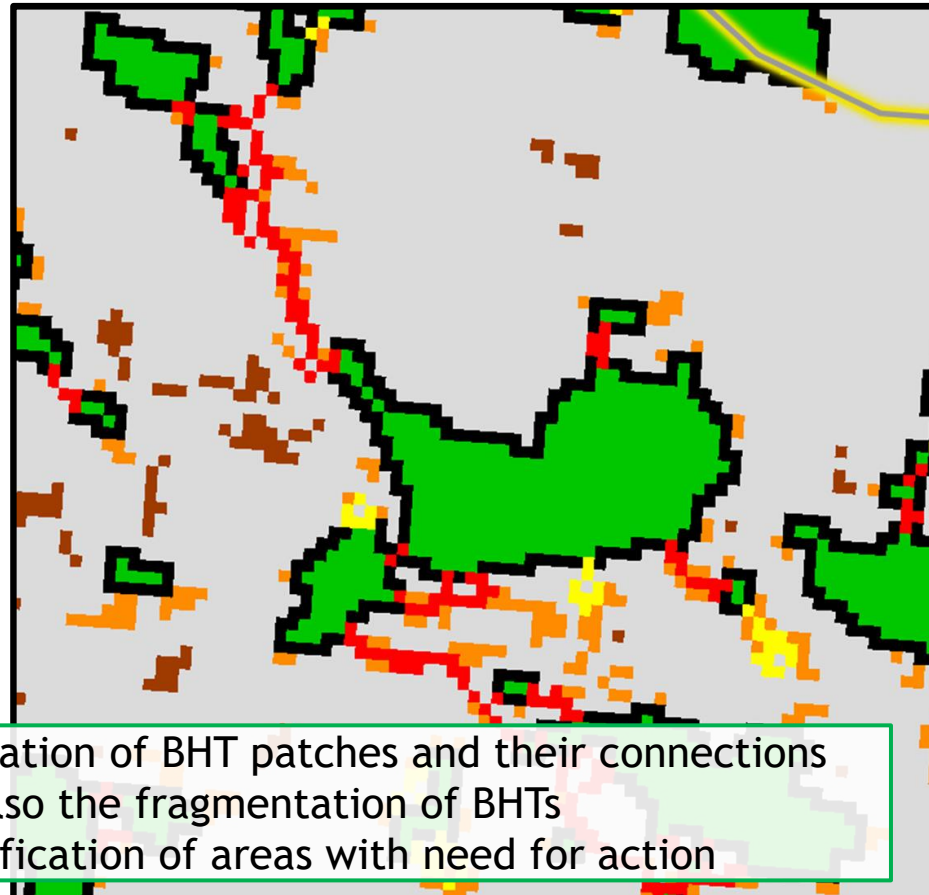
➔ Illustration of BHT patches and their connections
➔ and also the fragmentation of BHTs
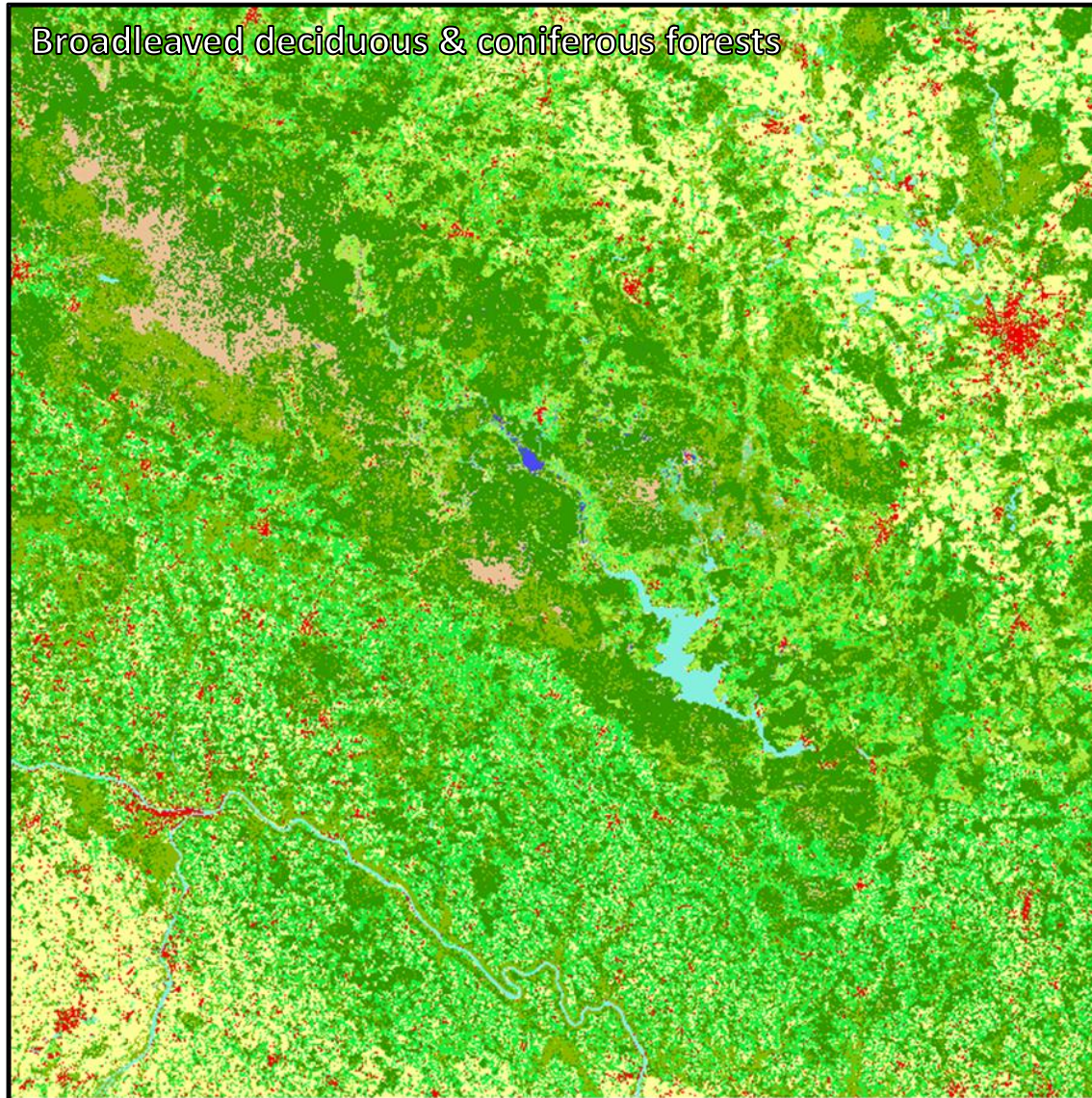➔ Identification of areas with need for action

MSPA & **Euclidean Distance**

GUIDOS
https://forest.jrc.ec.europa.eu/en/activities/lpa/gtb/

- measures the **degree of intactness, shape & spatial arrangement** of image components (Vogt et al., 2017)

- showing the influence zones inside and outside of objects of interest:

  - all BHTs

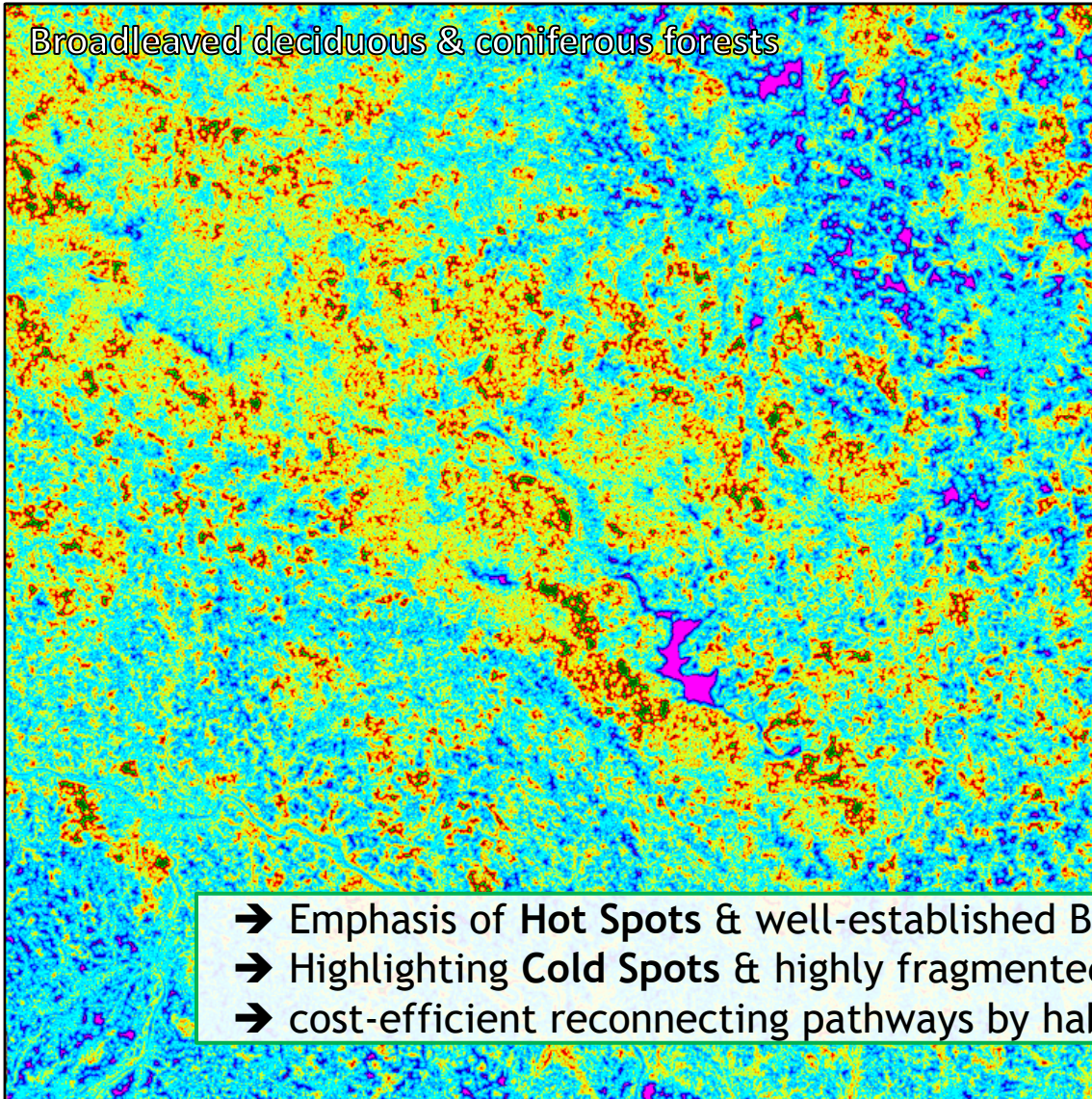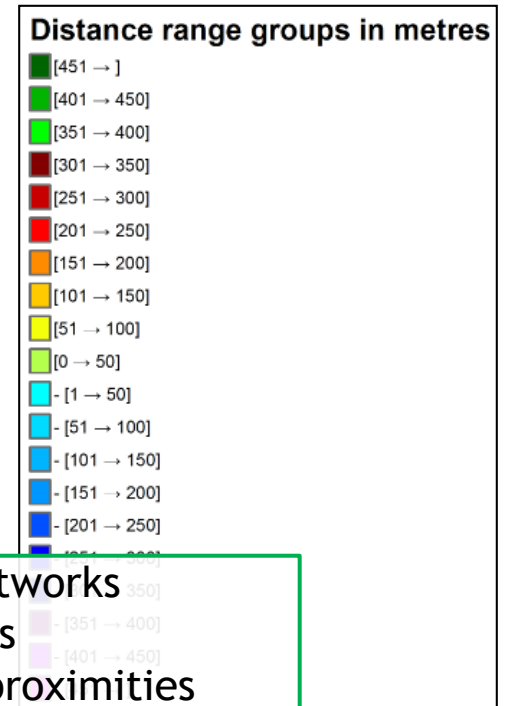 - specific habitat types (e.g. forests or extensive grassland)

universität wien

european greenbelt

Example: Pilot Region 1 - Šumava

Broadleaved deciduous & coniferous forests

Example: Pilot Region 1 - Šumava

Broadleaved deciduous & coniferous forests
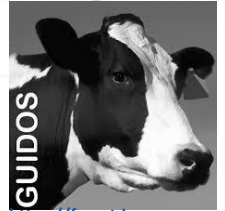
• Distance ranges **inside** and outside of BHT boundaries show the consistency and deficiencies of the network

Distance range groups in metres

- [451 →]
- [401 → 450]
- [351 → 400]
- [301 → 350]
- [251 → 300]
- [201 → 250]
- [151 → 200]
- [101 → 150]
- [51 → 100]
- [0 → 50]
- - [1 → 50]
- - [51 → 100]
- - [101 → 150]
- - [151 → 200]
- - [201 → 250]
- [251 → 300]
- [301 → 350]
- [351 → 400]
- [401 → 450]

➔ Emphasis of **Hot Spots** & well-established BHT networks
➔ Highlighting **Cold Spots** & highly fragmented areas
➔ cost-efficient reconnecting pathways by habitat proximities

Connectivity-Functionality Index (CFI)

- **Combination of the functionality & connectivity indices** for the European Green Belt

- CFI = **Indicator** for areas with **high potential as multifunctional corridor** between protected areas

- Elements of high functional value & connecting importance

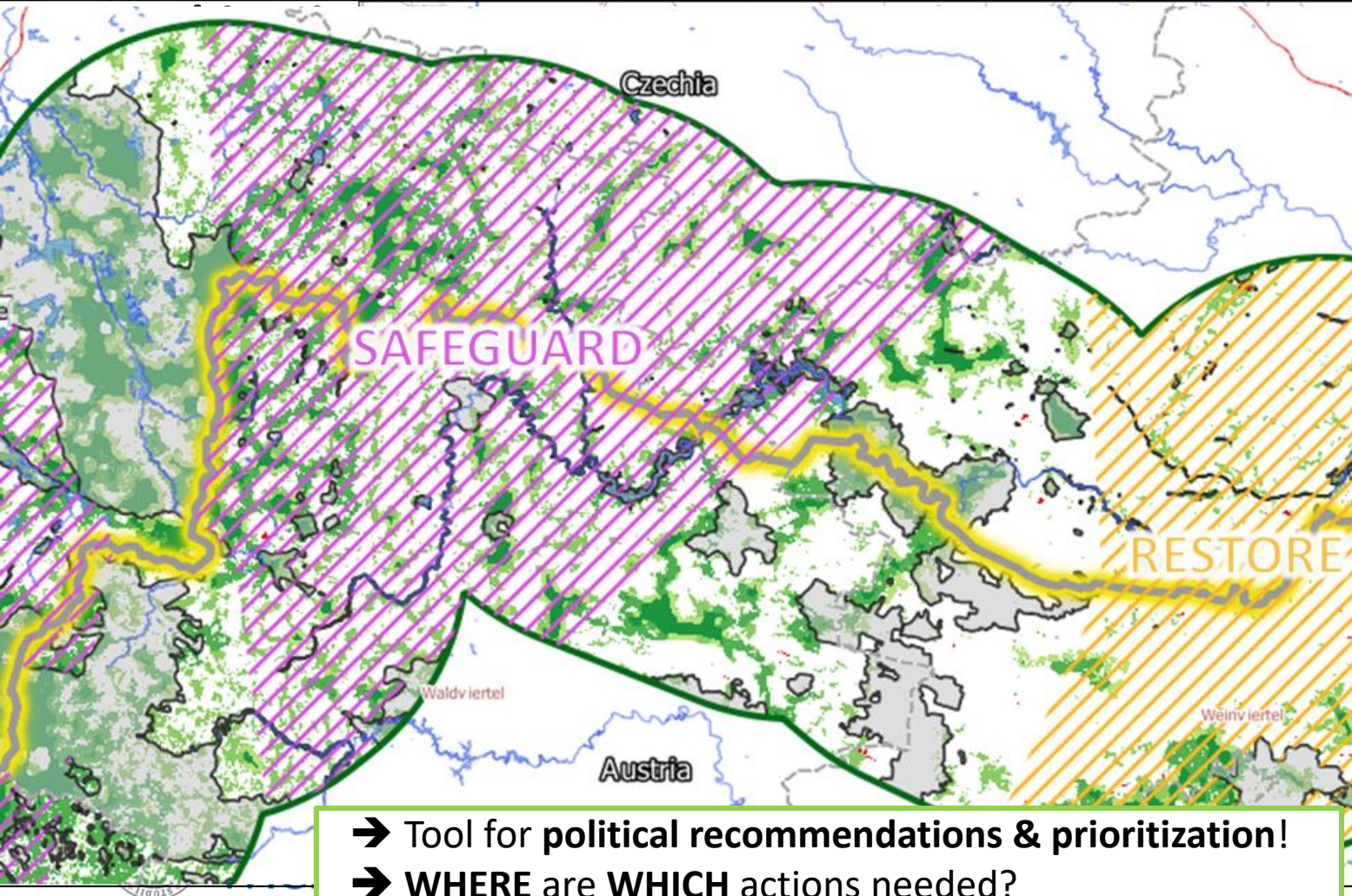- Designation of **Areas of Action** between PAs

→ **SAFEGUARD:**
- focus on **preserving the existing conditions** to improve GI network
- **Prevention** of habitat loss

→ **RESTORE:**
- **Reinstallation** of functional elements for the GI network
- **Restauration** of functionality of the existing habitats

Connectivity-Functionality Index (CFI)

The European Green Belt - AUT-CZ-SK

Connectivity Functionality Index:

Combination of the connectivity and multifunctionality in terms of provided ecosystem services by broader habitats to show the suitability as ecological corridor.

Potential as multifunctional corridor
- Very high
- Good
- Medium - Low
- No potential

- Green Belt Buffer (50km width)
- Green Belt
- Protected Areas
- National Borders
- NUTS-Regions Level 3
- Water bodies
- Water ways
- Highways
- Major Cities

Areas of Action
- Safeguard
- Restore

Produced by:
Fuchs S., University of Vienna
Division of Conservation Biology, Vegetation and Landscape Ecology, October 2020

This project is implemented in the framework of the Danube Transnational Programme and co-financed by European Regional Development Fund and Instrument for Pre-Accession Assistance.

➔ Tool for **political recommendations & prioritization**!
➔ **WHERE** are **WHICH** actions needed?

Let's dive in!

GIS Web Tool

Thank you for your attention!

Stefan Fuchs, MSc

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