SaveGREEN Final Conference | 07.12.2022

Mainstreaming Ecological Connectivity – Challenges, Ideas and Possible Solutions

MaGICLandscapes

Managing Green Infrastructure in Central European Landscapes

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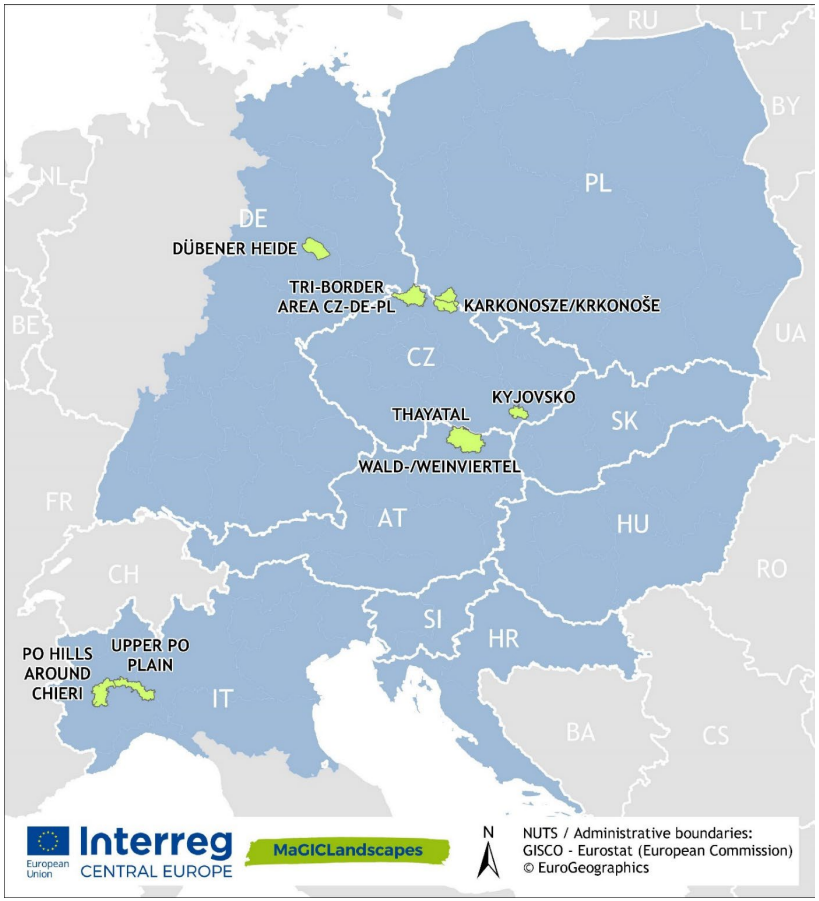
TECHNISCHE UNIVERSITÄT DRESDEN · VUKOZ · Sächsische Landesstiftung Natur und Umwelt Akademie · Leibniz Institute of Ecological Urban and Regional Development · universität wien · Thayatal · TORINO METROPOLI Città metropolitana di Torino · ENEA

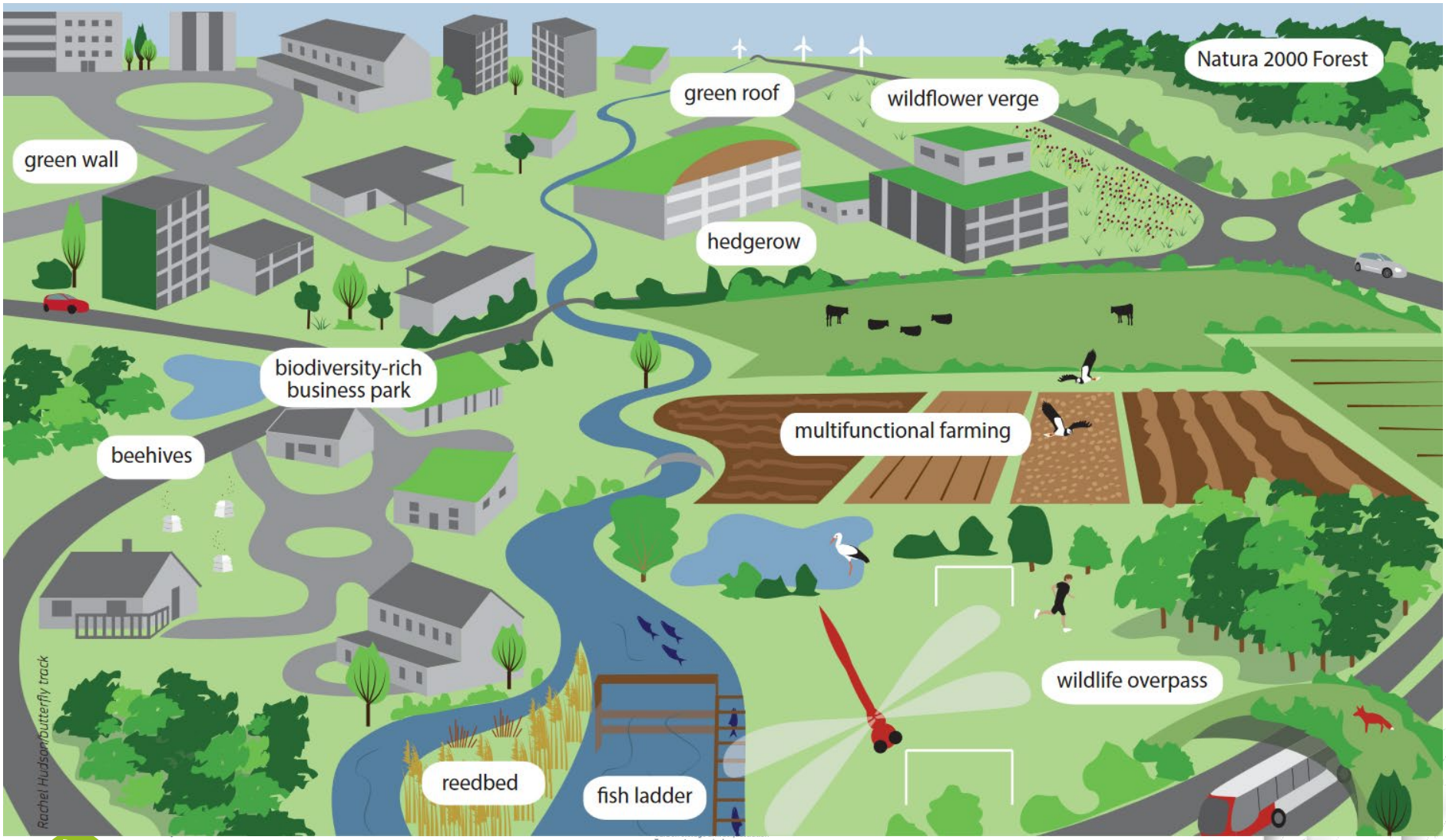
PROJECT COORDINATES

MaGICLandscapes – Managing Green Infrastructure in Central European Landscapes

- Interreg Central Europe Programme (ERDF)
- Duration: 07/2017 – 11/2020
- 10 partners from AT, CZ, DE, IT, PL
- 9 case study areas
- 33 Associated Partners



WHAT IS GREEN INFRASTRUCTURE?

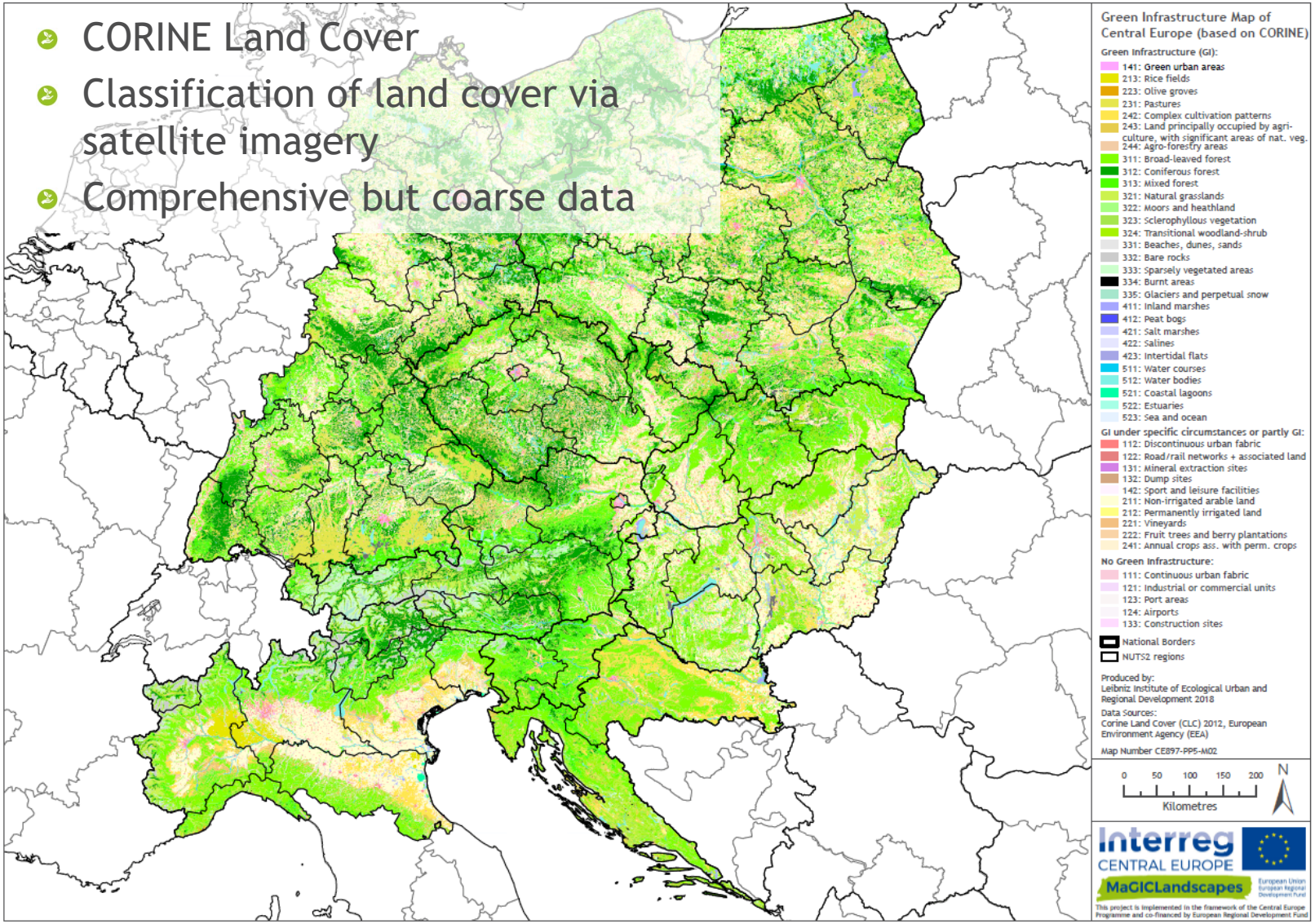


OBJECTIVES AND TASKS

- Inventory of GI regarding its spatial structure, functionality and ecosystem services on transnational, regional and local level
- Integrated approach: considering cross-sectoral policy and planning objectives
- Providing decision support for politicians, planners, land users/managers and communities to invest in GI
- Raising awareness of the GI concept as (informal) aid for spatial planning
- Communicating the benefits of GI

GREEN INFRASTRUCTURE - TRANSNATIONAL SCALE

- CORINE Land Cover
- Classification of land cover via satellite imagery
- Comprehensive but coarse data



GREEN INFRASTRUCTURE - TRANSNATIONAL SCALE

Where to find Green Infrastructure?

Green Infrastructure (GI):

- 141: Green urban areas
- 213: Rice fields
- 223: Olive groves
- 231: Pastures
- 242: Complex cultivation patterns
- 243: Land principally occupied by agri-culture, with significant areas of nat. veg.
- 244: Agro-forestry areas
- 311: Broad-leaved forest
- 312: Coniferous forest
- 313: Mixed forest
- 321: Natural grasslands
- 322: Moors and heathland
- 323: Sclerophyllous vegetation
- 324: Transitional woodland-shrub
- 331: Beaches, dunes, sands
- 332: Bare rocks
- 333: Sparsely vegetated areas
- 334: Burnt areas
- 335: Glaciers and perpetual snow
- 411: Inland marshes
- 412: Peat bogs
- 421: Salt marshes
- 422: Salines
- 423: Intertidal flats
- 511: Water courses
- 512: Water bodies
- 521: Coastal lagoons
- 522: Estuaries
- 523: Sea and ocean

GI under specific circumstances or partly GI:

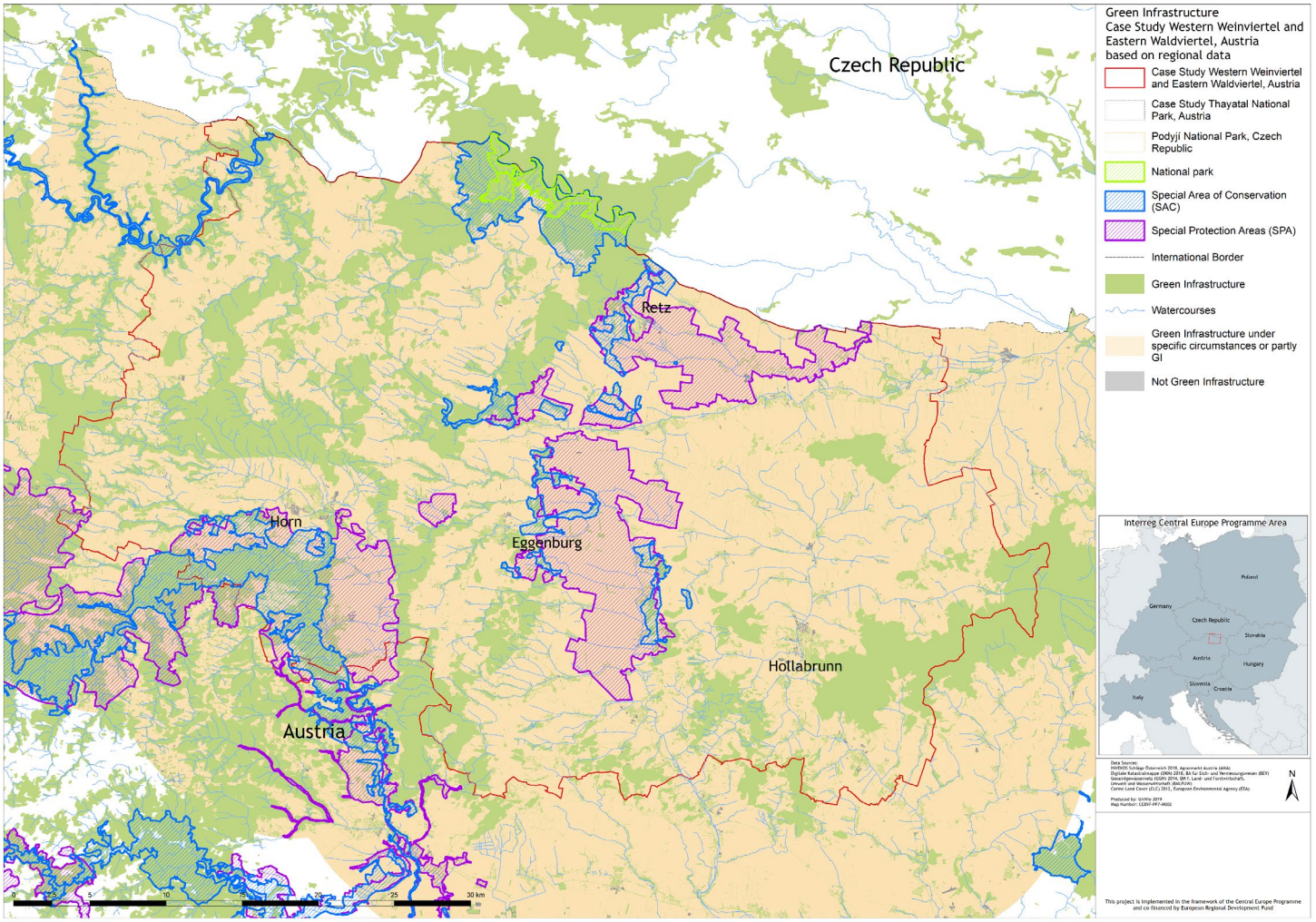
- 112: Discontinuous urban fabric
- 122: Road/rail networks + associated land
- 131: Mineral extraction sites
- 132: Dump sites
- 142: Sport and leisure facilities
- 211: Non-irrigated arable land
- 212: Permanently irrigated land
- 221: Vineyards
- 222: Fruit trees and berry plantations
- 241: Annual crops ass. with perm. crops

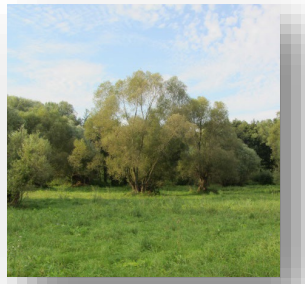
No Green Infrastructure:

- 111: Continuous urban fabric
- 121: Industrial or commercial units
- 123: Port areas
- 124: Airports
- 133: Construction sites

- useful on the transnational scale
- **but** lack of detail for regional/local implementation!

DESCRIPTION OF THE AREA

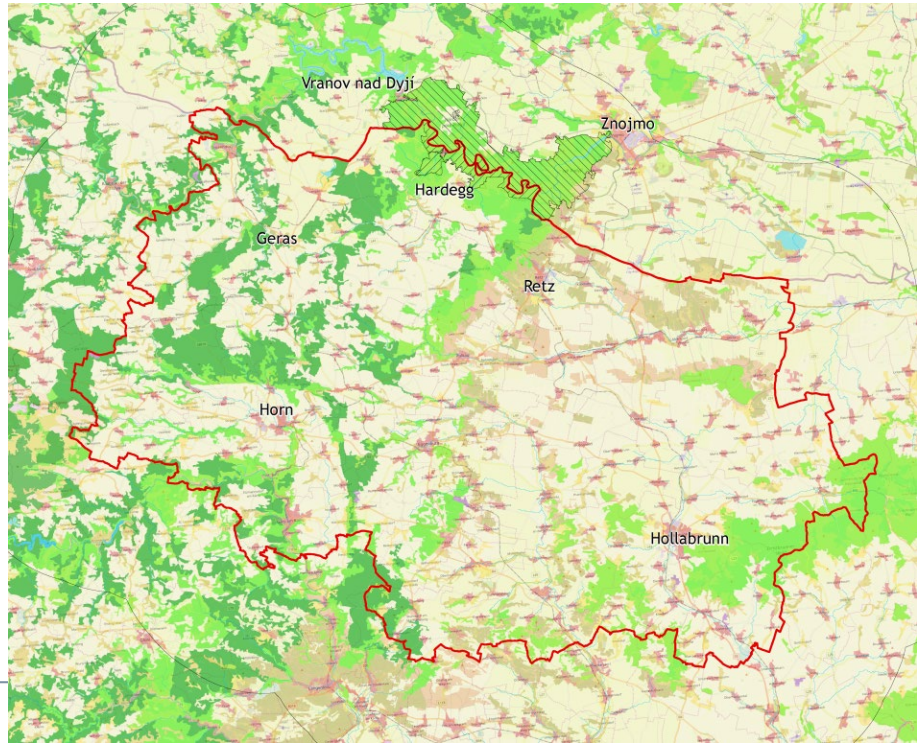


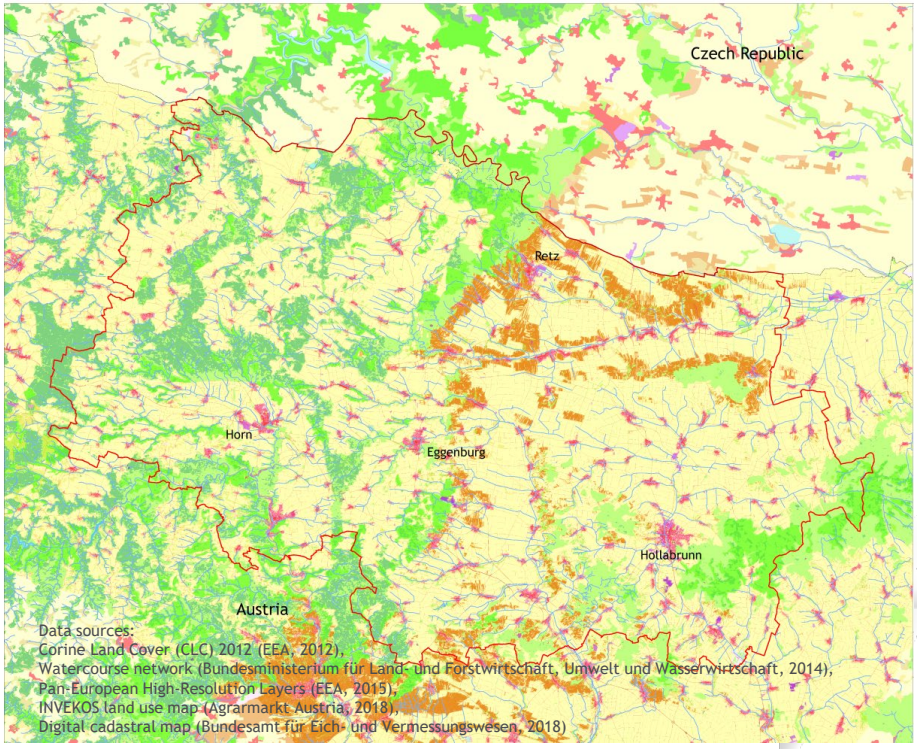


GREEN INFRASTRUCTURE - REGIONAL SCALE

- Extension of the CLC database
- Compilation of various regional geodata to map GI
- Using data of e.g. digital cadasters, agricultural data, forest inventories, waterways, etc.

Transnational scale *Database* **Regional scale**

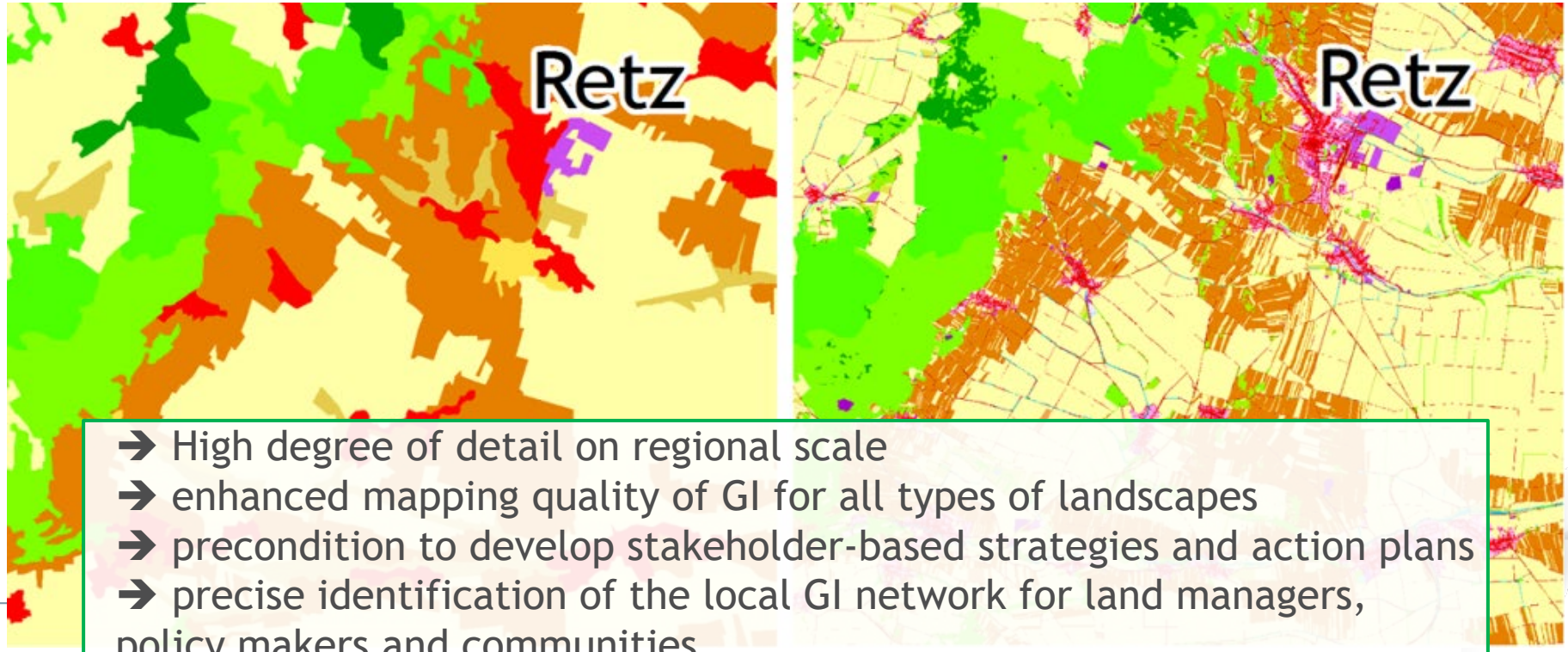




GREEN INFRASTRUCTURE - REGIONAL SCALE

- Regional data reveals differences in the realistic representation of GI
- Classification and generalization of transnational data
  - underrepresents fragmentation of GI (e.g. woodland, vineyards)
  - underrates provision of GI (e.g. arable land, urban fabric)

Transnational scale *Database* **Regional scale**



➔ High degree of detail on regional scale
➔ enhanced mapping quality of GI for all types of landscapes
➔ precondition to develop stakeholder-based strategies and action plans
➔ precise identification of the local GI network for land managers, policy makers and communities.

ANALYSIS OF CONNECTIVITY

GuidosToolbox

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

- free software package by the Joint Research Centre (JRC) of the European Commission
- Data input: binary raster image (GI or partly GI = 2, no GI = 1)
  - **Morphological Spatial Pattern Analysis (MSPA)**
    - universal pattern analysis framework provided by a sequence of morphological operators
    - performs a segmentation to identify and localize mutually exclusive morphometric features
    ➔ describes the ***geometry, connectivity and spatial arrangement of image components***
  - **Euclidean Distance**
    - creates map of objects of interest showing the influence zones inside and outside those objects
    - derive the pairwise proximity between neighboring objects
    ➔ measures the ***degree of intactness, shape and spatial arrangement of image components***

ANALYSIS OF CONNECTIVITY - MSPA

Interreg CENTRAL EUROPE
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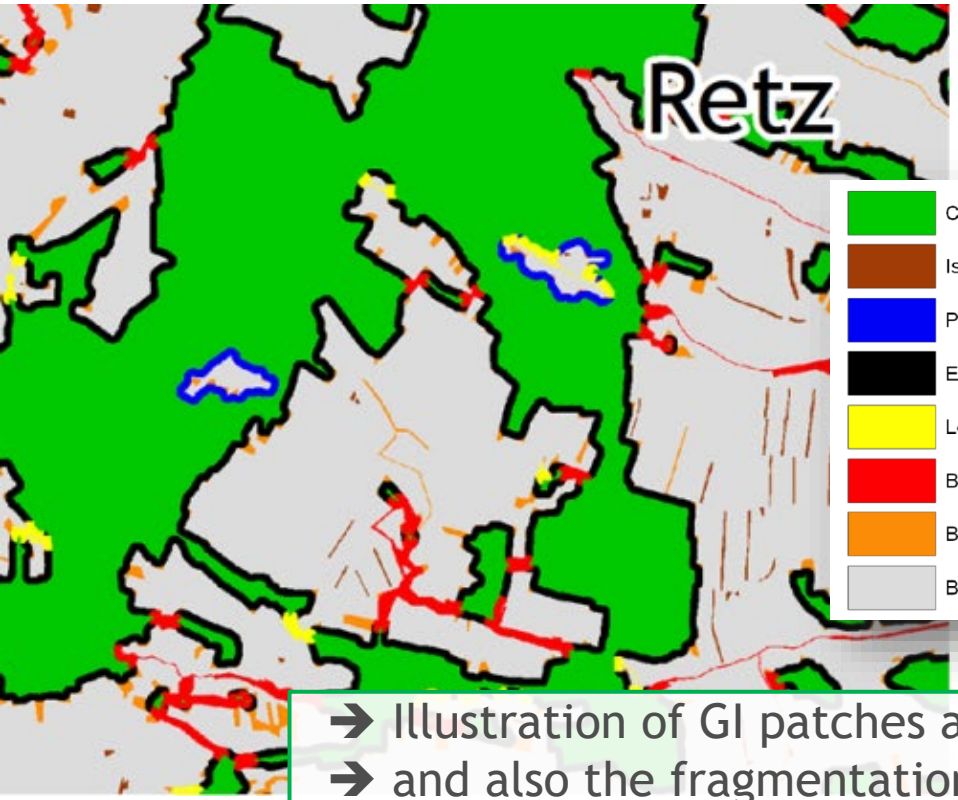
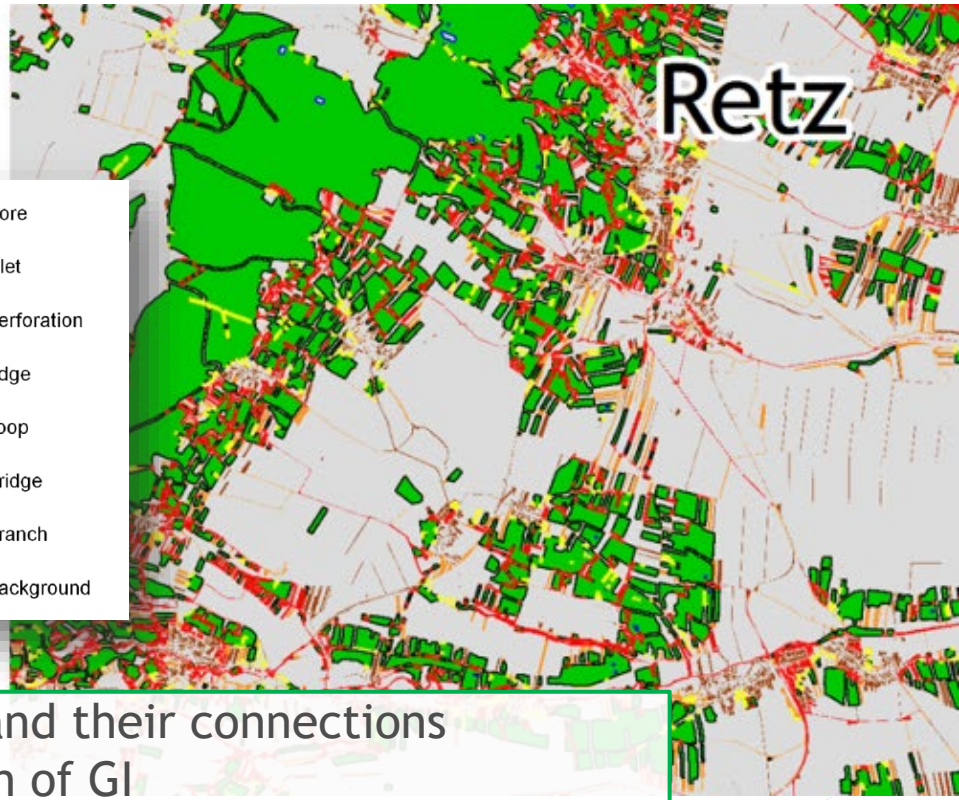
Transnational level



Regional level



➔ Illustration of GI patches and their connections
➔ and also the fragmentation of GI
➔ Identification of areas with need for protection & action

ANALYSIS OF CONNECTIVITY

GuidosToolbox

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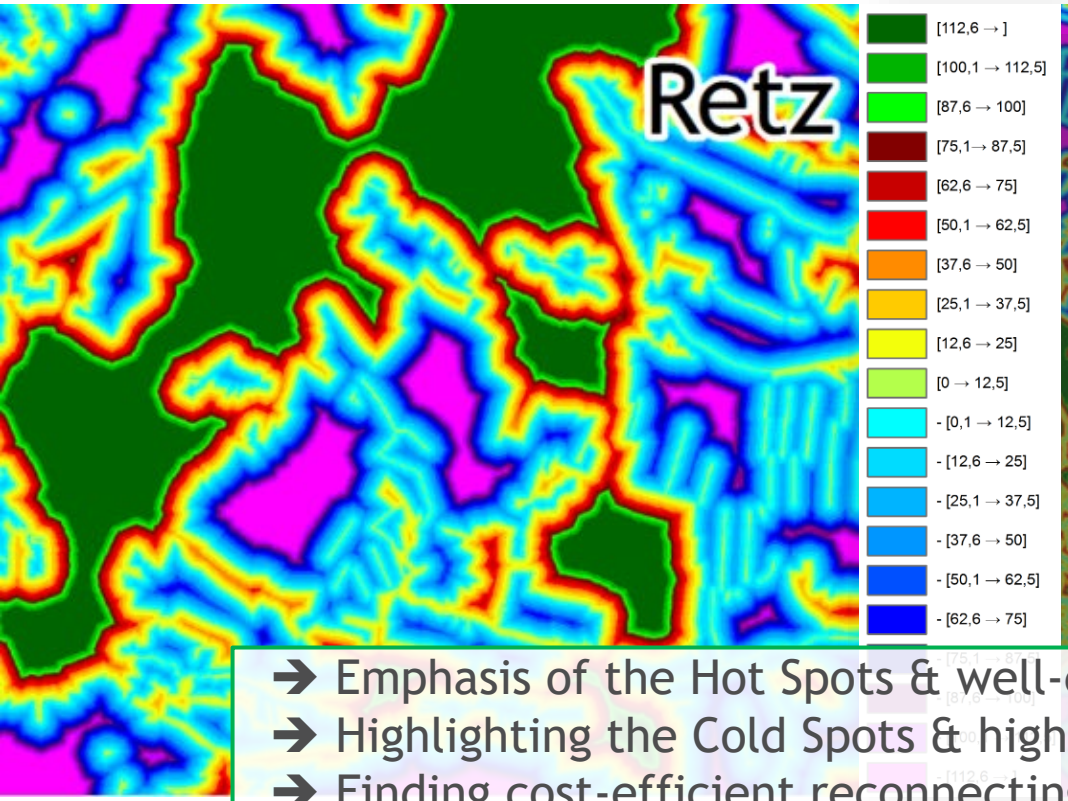
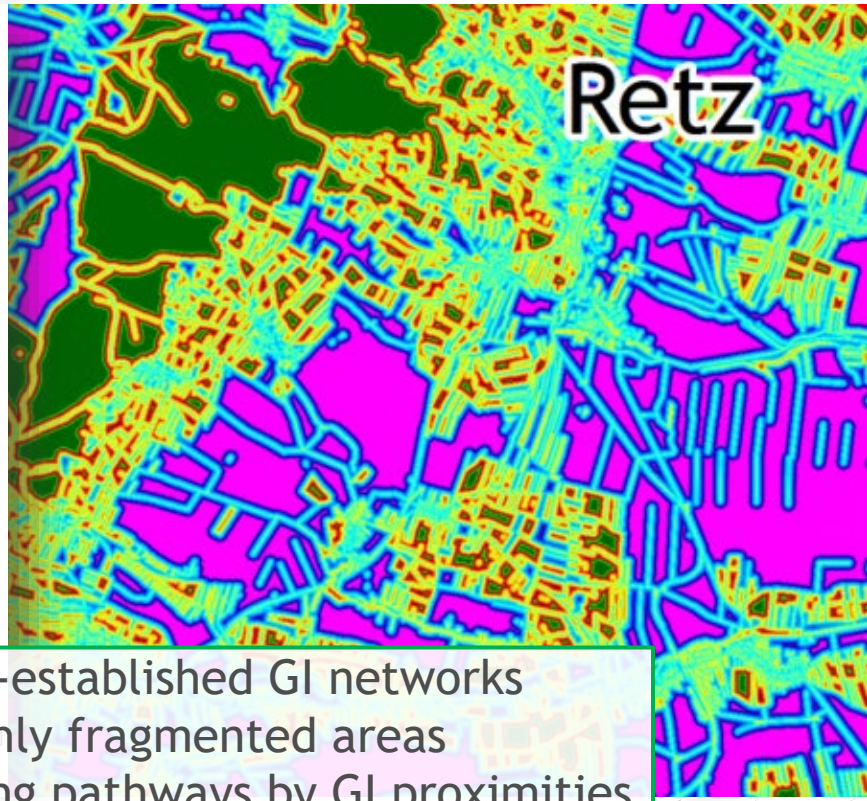
ANALYSIS OF CONNECTIVITY - EUCLIDEAN DISTANCE

Interreg CENTRAL EUROPE
MaGICLandscapes

Transnational level



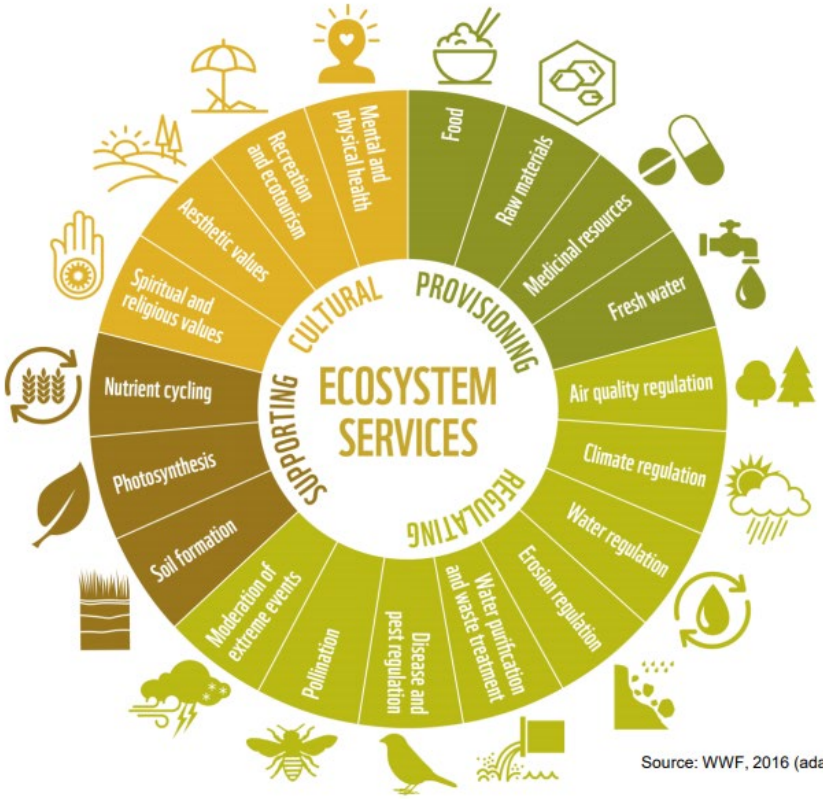
Regional level



➔ Emphasis of the Hot Spots & well-established GI networks
➔ Highlighting the Cold Spots & highly fragmented areas
➔ Finding cost-efficient reconnecting pathways by GI proximities

ANALYSIS OF FUNCTIONALITY

Assessment of landscape services - Where do we start?



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

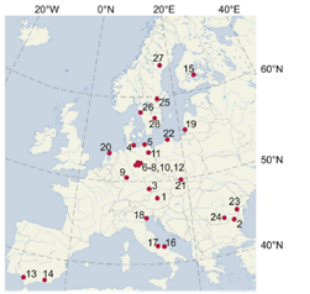
- Capacity matrices as a widely used tool for assessing ecosystem services
- Capacity matrix = look-up table that connects land cover types to ecosystem services or landscape services potentially provided
- **Implementation in MaGICLandscapes:** analyze the functionality by plotting LSS matrix on regional geodata sets

ANALYSIS OF FUNCTIONALITY

1.) Translation

Assessment of ecosystem integrity and service gradients across Europe using the LTER Europe network

Stefan Stoll[a,b,*], Mark Frenzel[c], Benjamin Burkhard[d,e], Mihai Adamescu[f], Algirdas Augustaitis[g], Cornelia Baeßler[c], Francisco J. Bonet[h], Maria Laura Carranza[i], Constantin Cazacu[f], Georgia L. Cosor[f], Ricardo Díaz-Delgado[j], Ulf Grandin[k], Peter Haase[a,b], Heikki Hämäläinen[l], Rob Loke[m], Jörg Müller[n,o], Angela Stanisci[i], Tomasz Staszewski[p], Felix Müller[d]



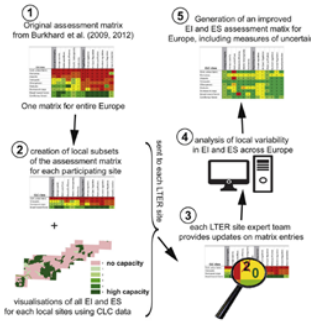
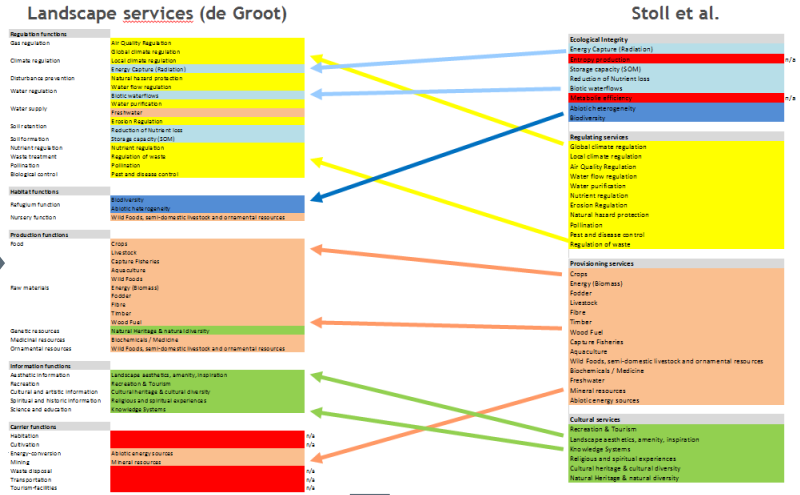
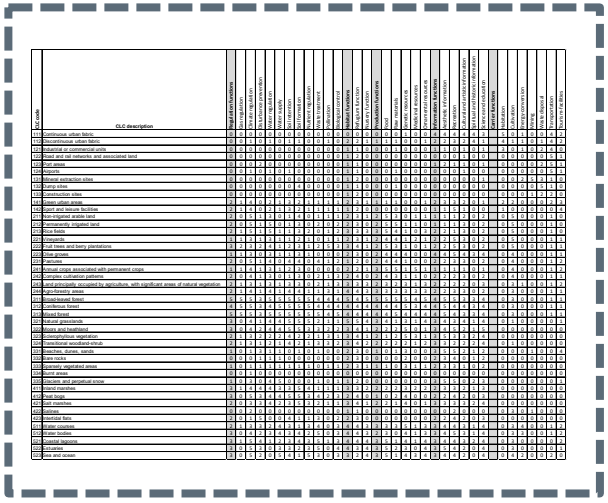


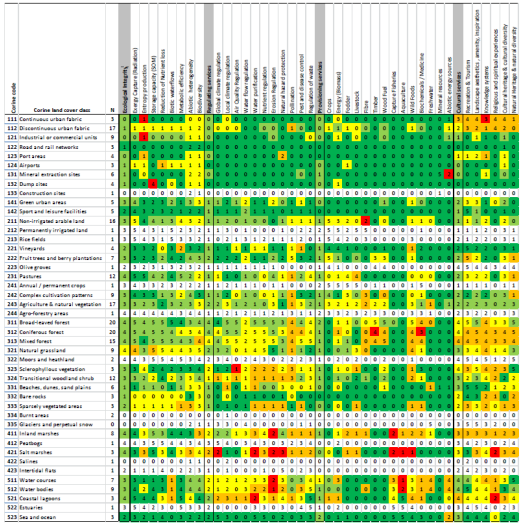
Fig. 2. Location of the 28 sites that participated in this study. Numbers given in the map correspond to the site numbering in Table 1.

Stoll S. et al. (2015):
https://doi.org/10.1016/j.ecolmodel.2014.06.019



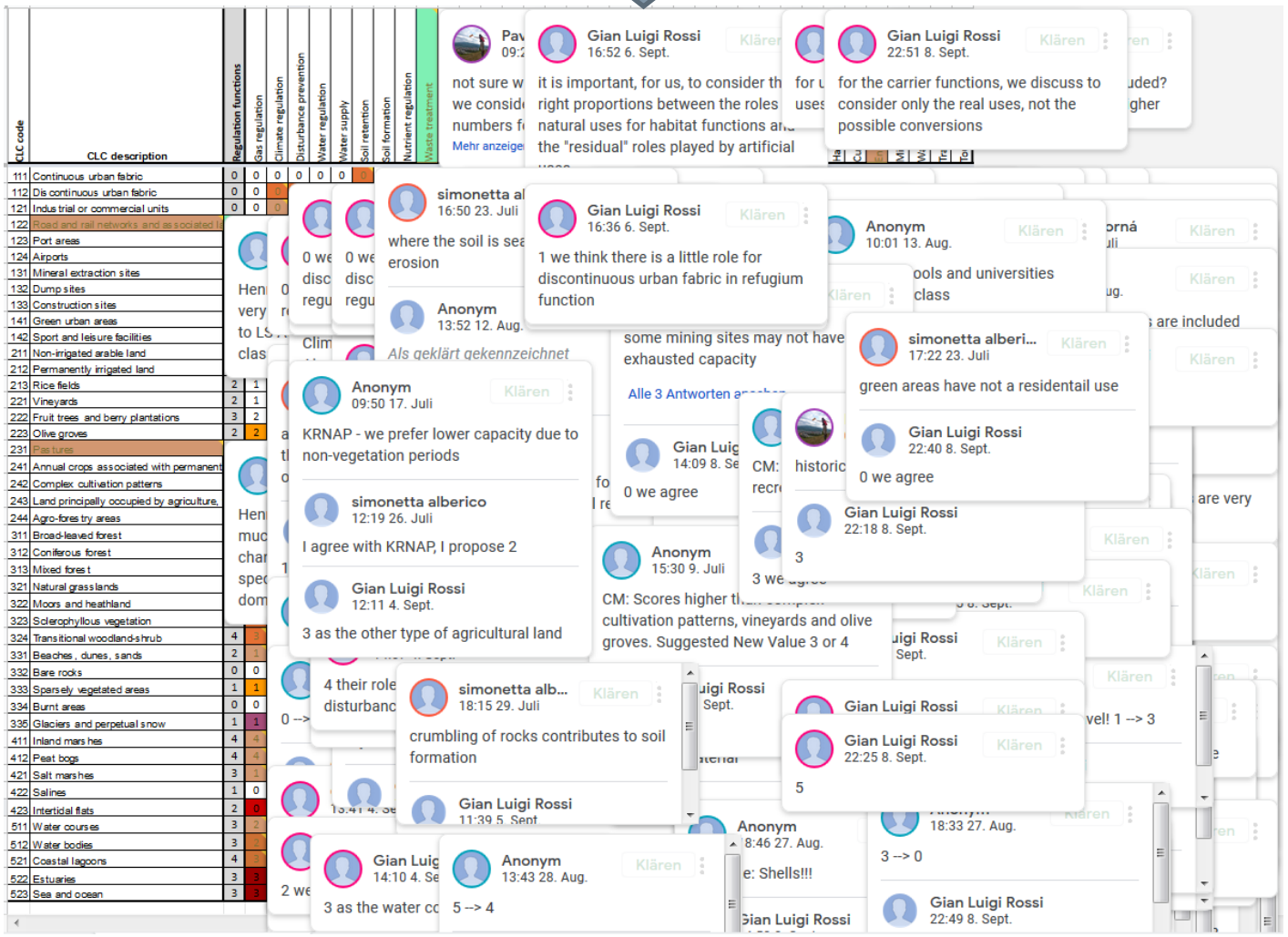
Groot et al. (2002, 2006 and 2010):
http://dx.doi.org/10.1016/j.landurbplan.2005.02.016
http://dx.doi.org/10.1016/j.ecocom.2009.10.006
http://dx.doi.org/10.1016/S0921-8009(02)00089-7





ANALYSIS OF FUNCTIONALITY

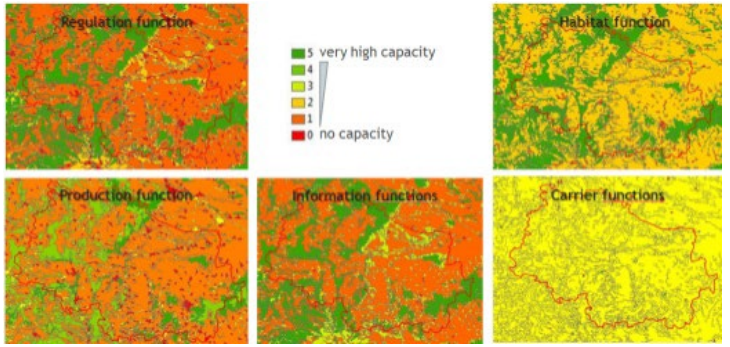
3.) Joint expert based validation by ML partners



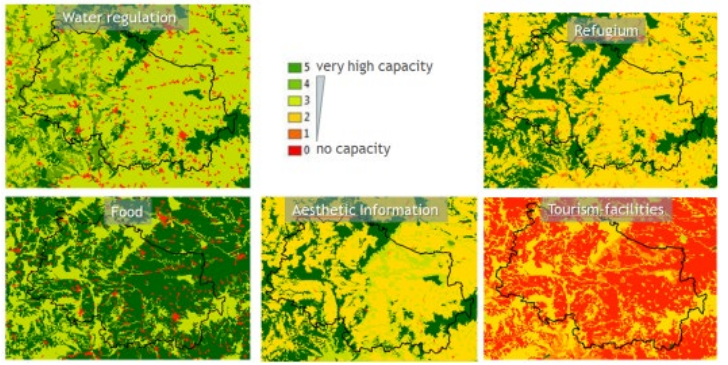
ANALYSIS OF FUNCTIONALITY

Maps demonstrating functionality

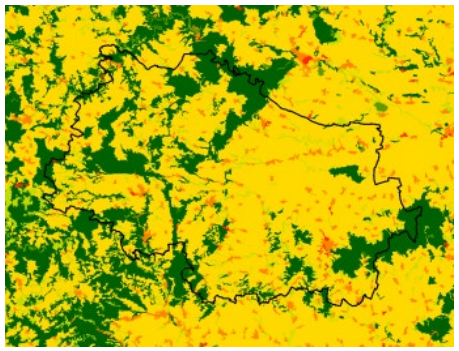
- Relevant single categories of LSS (actual values of single LSS)



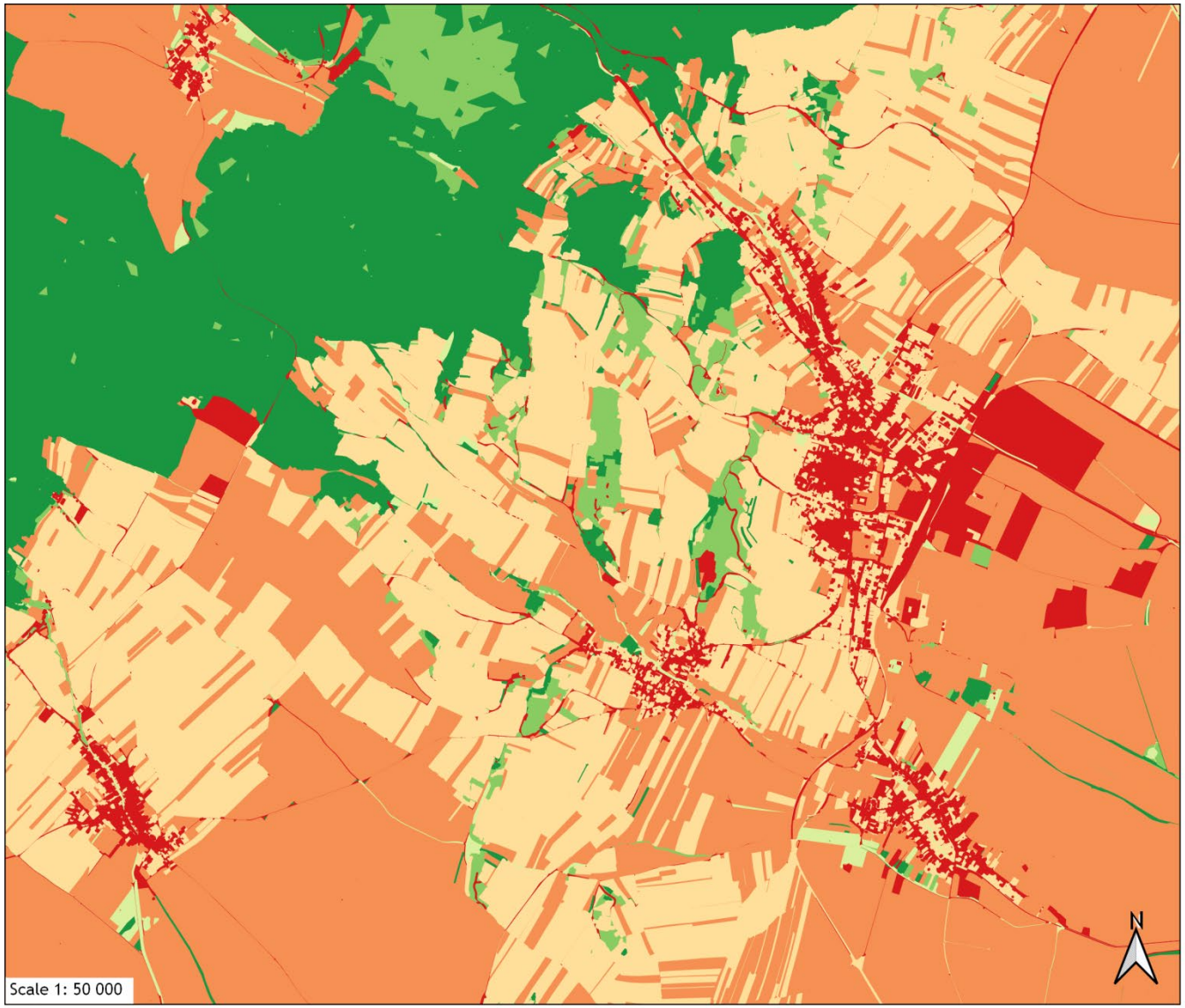
- Main categories of LSS (mean values of single LSS)



- Total function value (multifunctionality of GI)



ANALYSIS OF FUNCTIONALITY



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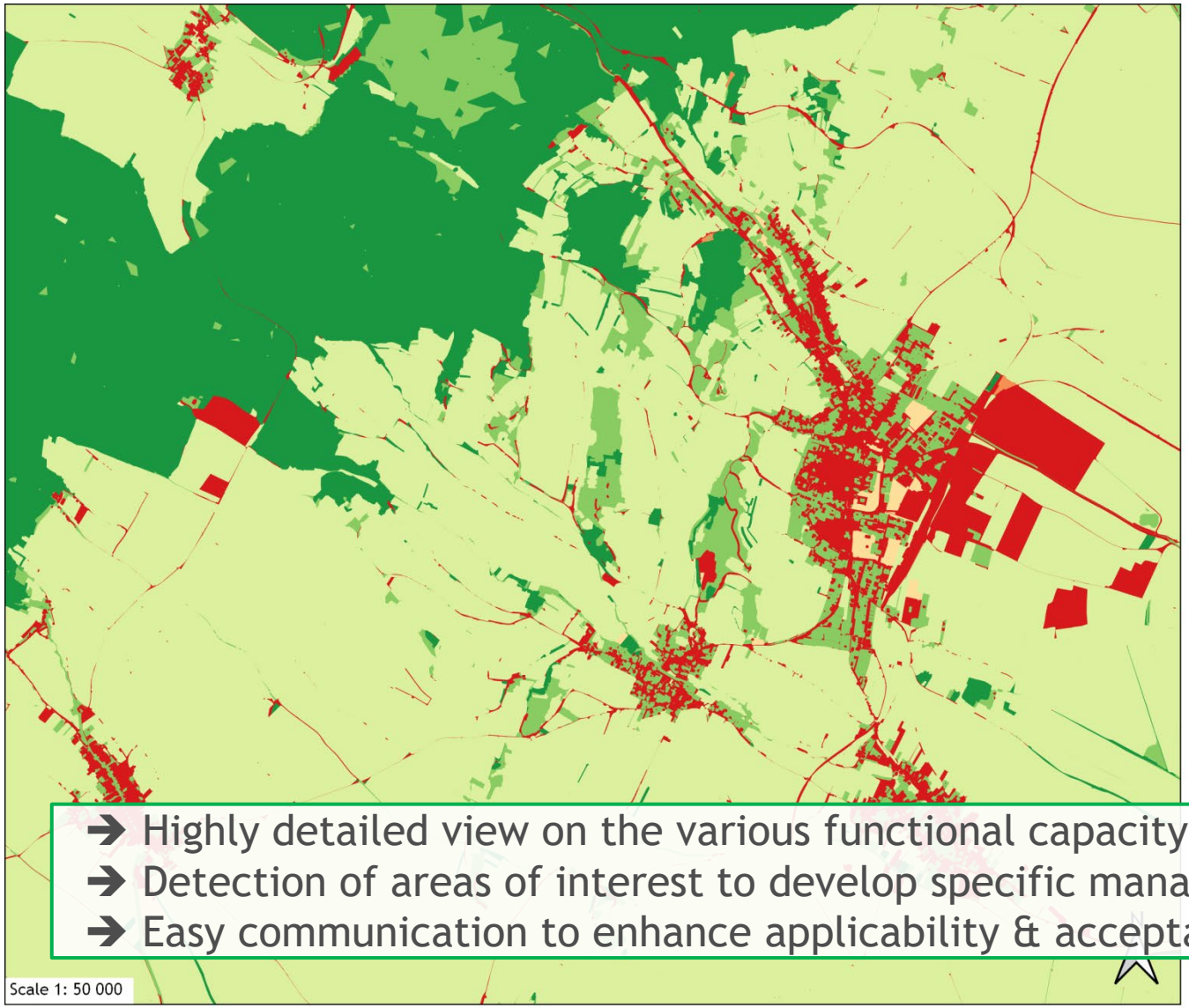
ANALYSIS OF FUNCTIONALITY



- ➔ Highly detailed view on the various functional capacity of GI
- ➔ Detection of areas of interest to develop specific management strategies
- ➔ Easy communication to enhance applicability & acceptance of GI initiatives

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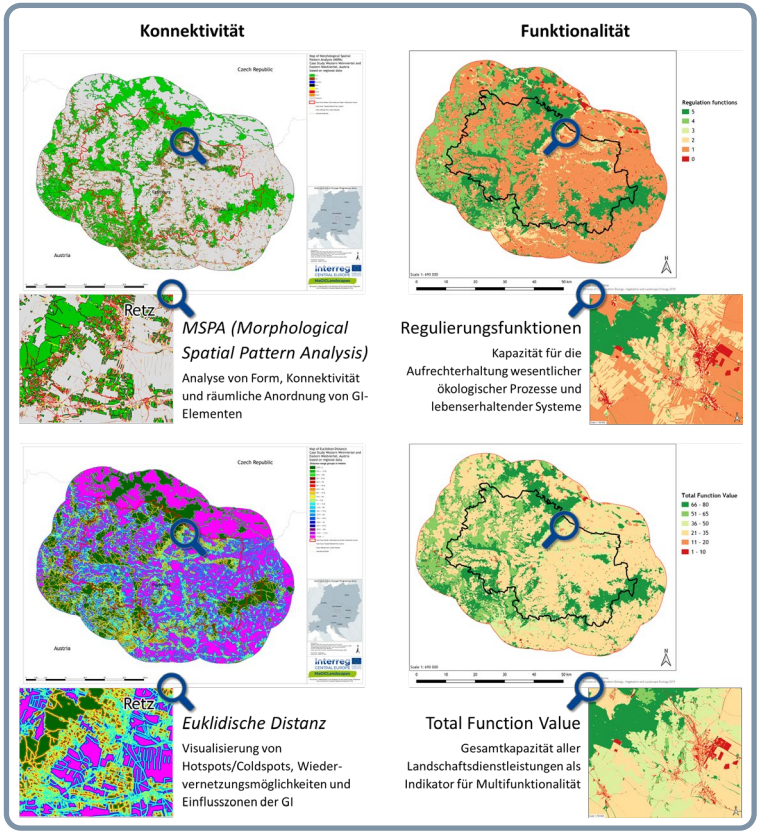
OVERVIEW

ASSESSMENT OF GI CONNECTIVITY & FUNCTIONALITY



STRATEGY & ACTION PLANS

STAKEHOLDER INVOLVEMENT

Aktionspläne der Strategie

Aktionsplan 1 - Aufwertung der ausgeräumten, **ackerbaudominierten Kulturlandschaft** durch Wiedereinräumung mit Landschaftselementen, wie Hecken, Feldrainen oder Blühstreifen.

Aktionsplan 2 - Klimagerechter Waldumbau von **Fichtenbeständen** mit standortgerechten Baumarten sowie Ausweisung von Naturwaldreservaten.

Aktionsplan 3 - Schaffung von Retentions- und Pufferräumen, Gewässeraufweitung, Förderung von Kleingewässern sowie Erhöhung der Strukturvielfalt in Flussbetten und Uferbereichen von **Gewässern und Feuchtlebensräumen** zur ökologischen Aufwertung, Anhebung des Grundwasserspiegels und Verbesserung des Hochwasserschutzes.

Aktionsplan 4 - Absicherung und Verbesserung von Grüner Infrastruktur in Bereichen der **Obst- und Weinbaukomplexe** durch den Erhalt von und die Rückbesinnung auf die traditionelle kleinstrukturierte Kulturlandschaft und ihren zahlreichen Zwischenstrukturen, wie Böschungen, Baumzeilen und Einzelbäumen.

Aktionsplan 5 - Gezielte Pflege und Wiederaufnahme traditioneller Nutzungsformen wie Mahd und Beweidung der verbliebenen **Trockenrasen, Wiesen und Weiden** die als verstreute Restflächen innerhalb der intensiv genutzten Kulturlandschaft, besonders durch Verbuschung und Verbrachung bedroht sind. Dadurch können diese artenreichen Lebensräume als wertvolle Elemente der regionalen Grünen Infrastruktur dauerhaft erhalten werden.

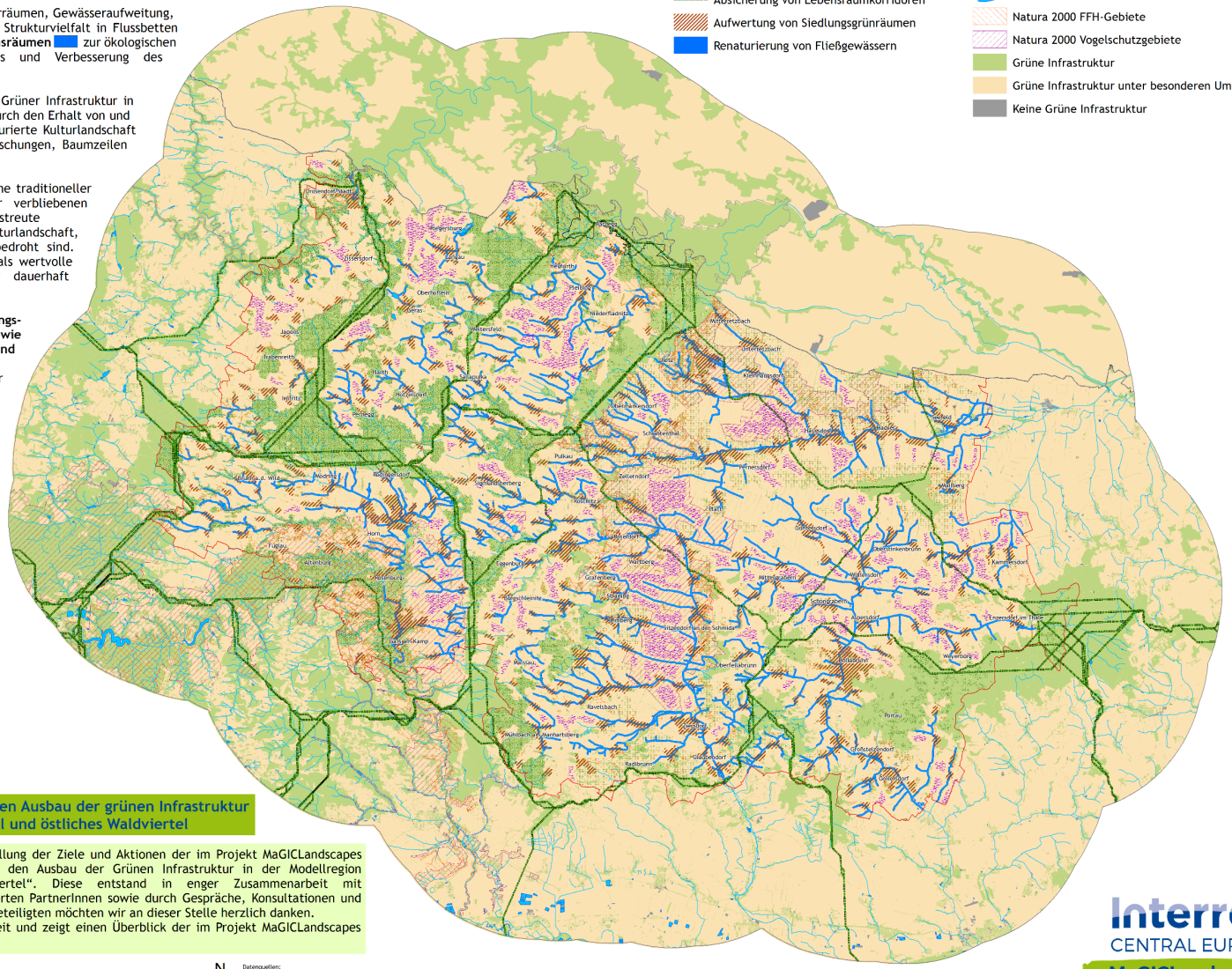
Aktionsplan 6 - Verbesserungsmaßnahmen für **siedlungsnahe Grünflächen, wie Hausgärten und Parks sowie Begleitflächen von Straßen- und Schieneninfrastruktur** , als Elemente der Grünen Infrastruktur im direkten Lebensumfeld der Bevölkerung der Projektregion, bieten die Möglichkeit die Umweltbedingungen in den Dörfern und Städten zu verbessern und die Lebensqualität der Menschen zu erhöhen.

Aktionsplan 7 - Absicherung und Einrichtung von **Lebensraumkorridoren** zur Wiedervernetzung von Schutzgebieten, Verbesserung eines wirksamen Biotopverbunds und Erhöhung der Durchgängigkeit der Landschaft.

Ziele der Strategie

- Klima- und standortgerechter Waldumbau
- Pflege von Trockenrasen, Wiesen und Weiden
- Wiedereinräumung von Agrarlandschaften
- Ökologisierung von Obst- und Weinbau
- Absicherung von Lebensraumkorridoren
- Aufwertung von Siedlungsgrünräumen
- Renaturierung von Fließgewässern

- Staatsgrenze Österreich-Tschechien
- Modellregion westliches Weinviertel und östliches Waldviertel
- Modellregion Nationalpark Thayatal
- National Park Podyjí, Tschechien
- Flüsse und Bäche
- Seen und Teiche
- Natura 2000 FFH-Gebiete
- Natura 2000 Vogelschutzgebiete
- Grüne Infrastruktur
- Grüne Infrastruktur unter besonderen Umständen
- Keine Grüne Infrastruktur



Strategiekarte für die Verbesserung und den Ausbau der grünen Infrastruktur in der Modellregion westliches Weinviertel und östliches Waldviertel

Die Strategiekarte zeigt eine kartografische Darstellung der Ziele und Aktionen der im Projekt MaGICLandscapes entwickelten Strategie für die Verbesserung und den Ausbau der Grünen Infrastruktur in der Modellregion „westliches Weinviertel und östliches Waldviertel“. Diese entstand in enger Zusammenarbeit mit EntscheidungsträgerInnen, AkteurInnen und assoziierten PartnerInnen sowie durch Gespräche, Konsultationen und Workshops mit StakeholderInnen der Region. Allen Beteiligten möchten wir an dieser Stelle herzlich danken.
Die Karte erhebt keinen Anspruch auf Vollständigkeit und zeigt einen Überblick der im Projekt MaGICLandscapes festgestellten theoretischen Bedarfe.

0 5 10 20 30 Kilometer

N

Datenquellen:
INVEKOS Schläge Österreich 2018, Agrarmarkt Austria (AMA)
Digitale Katastralmappe (DKM) 2018, BA für Eich- und Vermessungswesen (BEV)
Gesamtgewässernetz (GGN) 2014, BM f. Land- und Forstwirtschaft, Umwelt und Wasserwirtschaft (BMLFUW)
Corine Land Cover (CLC) 2012, European Environmental Agency (EEA)
Orte in Niederösterreich (1:500.000) 2020, Amt der NÖ Landesregierung
Lebensraumkorridore Österreich 2018, Umweltbundesamt Wien
Erstellt durch: Universität Wien 2020, Kartennummer: CZ897-P97-N201

Interreg CENTRAL EUROPE
European Union European Regional Development Fund

MaGICLandscapes

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ACTIONS TO MEET THE STRATEGIC AIMS

- Action Plan 1

  Enhancement of the **featureless, agricultural landscape** by introducing landscape elements, such as hedges, field margins or flower strips

- Action Plan 2

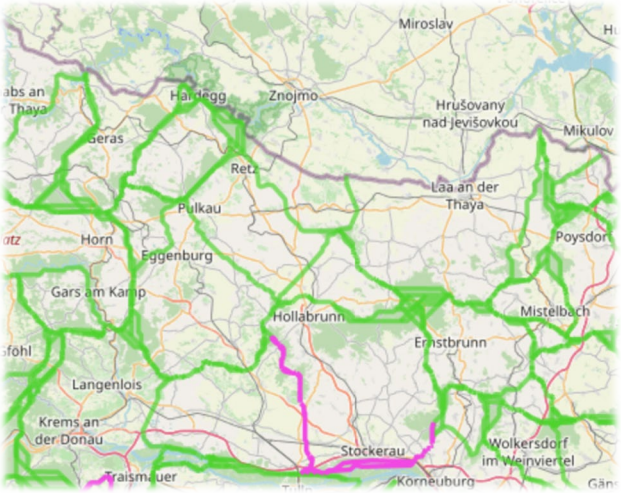
  Conversion of **spruce plantations** to climate-adapted tree species appropriate to local conditions as well as the designation of **natural forest reserves**

- Action Plan 3

  Creation of retention and buffer areas, widening and promotion of small water bodies as well as an increase of structural diversity of river beds and bank areas of **water bodies and wetland** habitats

ACTIONS TO MEET THE STRATEGIC AIMS

- **Action Plan 6**
  Promotion of green areas in **urban and rural settlements**, such as home gardens and parks as well as associated land of **road and rail network**
- **Action Plan 7**
  Securing and establishing **habitat corridors** to re-connect protected areas, improve an effective **biotope network** and increase the connectivity of the landscape



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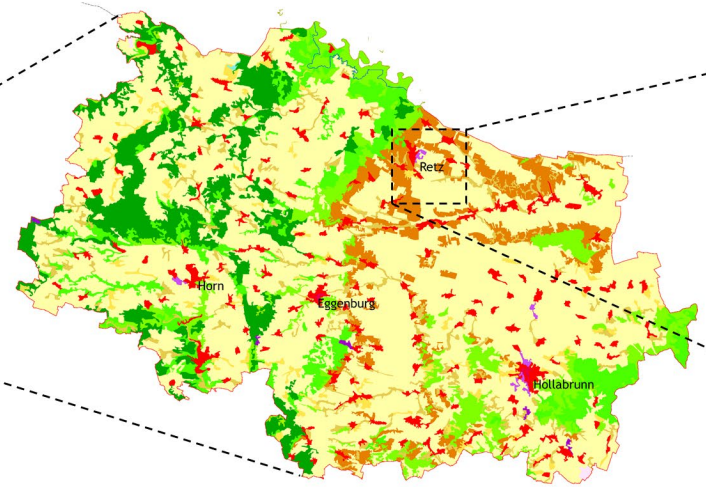

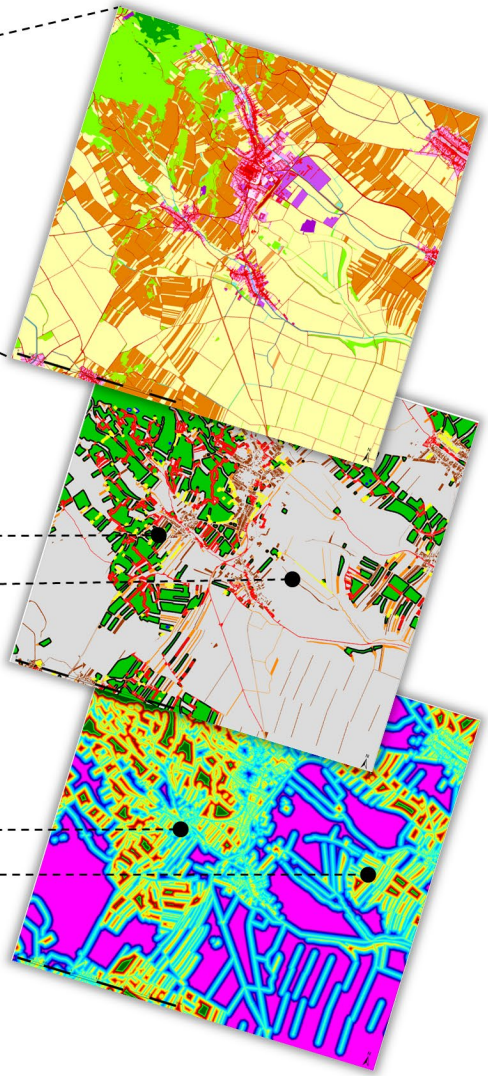

MAGICLANDSCAPES

Building a green infrastructure for Europe (European Commission, 2013)

Ass.Prof. Dr. Thomas Wrbka
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Biodiversity Dynamics and Conservation

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