

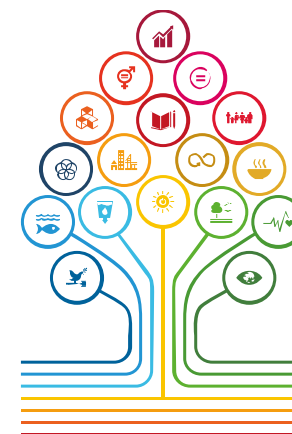


Deployment of green infrastructure as a means to maintain ecological connectivity in the Carpathians

Piotr Mikołajczyk, Ph.D.
UNEP/GRID-Warsaw Centre



Since 1991



25–28 November 2019 Colțești, Alba – ROMANIA

Transboundary workshops on promoting case studies and best practices on implementation of transboundary monitoring of LC populations and fostering transnational information exchange and transboundary cooperation on illegal killings organized within the Life EUROLARGE CARNIVORES Project (LIFE16 GIE/DE/000661 “Improving human coexistence with large carnivores in Europe through communication and transboundary cooperation”)



Project LIFE16 GIE/PL/000648 is co-financed by the European Union within the LIFE Programme and the National Fund for Environmental Protection and Water Management



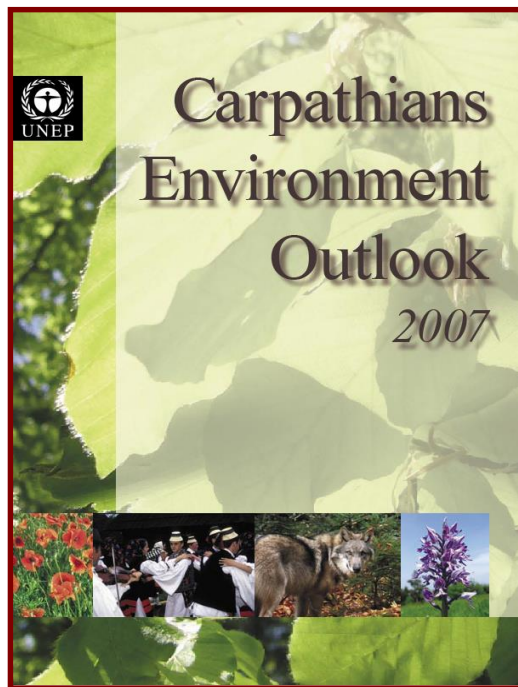


TOPICS

1. **Our LIFE project**
2. **Spatial analysis of conditions for GI development in Polish Carpathians**
3. **Demonstration of geoinformation tools – the geoportal coupled with a mobile application – for Green Infrastructure inventory, mapping, and assessment**
4. **Multimedia for GI awareness building**



Long history and portfolio of our Carpathian activities related to the implementation of Carpathian Convention





The KARPATY ŁĄCZA (Carpathians Unite) family





LIFE **Green-Go!** CARPATHIANS

Local initiatives for deployment of green infrastructure
within Natura 2000 sites in the Carpathians



LIFE16 GIE/PL/000648

Environmental Governance and Information

Information, communication and awareness raising campaigns in line with the priorities of the 7th EAP



National Fund
for Environmental Protection
and Water Management



In partnership with
UN Environment

Project LIFE16 GIE/PL/000648 is co-financed by the European Union within the LIFE Programme
and the National Fund for Environmental Protection and Water Management



National Fund
for Environmental Protection
and Water Management

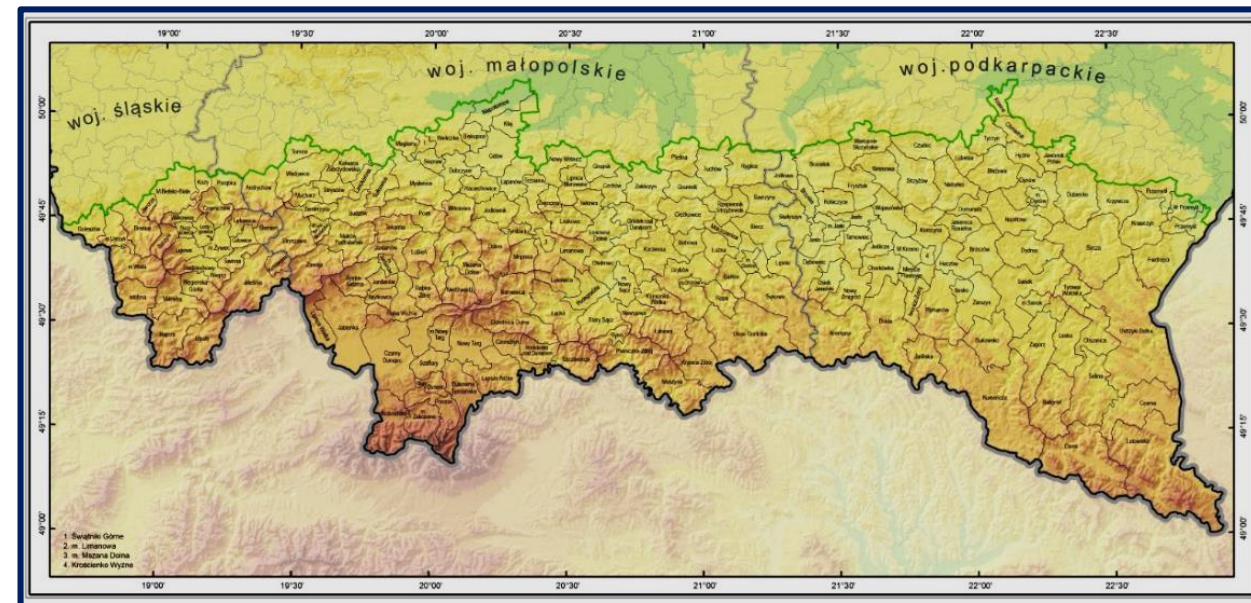


Implementation period: Sep. 2017 – Dec. 2020

Primary target groups:

- local self-gov. authorities
- Local Action Groups (LAGs)
- local communities

from the 200 Carpathian communes



Other partners / stakeholders:

- regional nature protection authorities in charge of Natura 2000
- landscape and national parks
- regional (province) self-governments
- other: selected NGOs, regional forestry authorities, agricultural institutions.....



Objectives

- supporting **liaison** and **cooperation** of **local stakeholders** towards the **maintenance, restoration and enhancement of green infrastructure** in Polish Carpathians
- **disseminating knowledge** on the role and importance of green infrastructure and ecological connectivity for biodiversity conservation, access to **ecosystem services** and **sustainable local development**
- promoting use of **spatial data resources** and **geoinformation tools** in spatial planning and management of nature-sensitive areas
- dissemination of **good practices of participatory spatial management** among the **Carpathian region countries**.



Actions

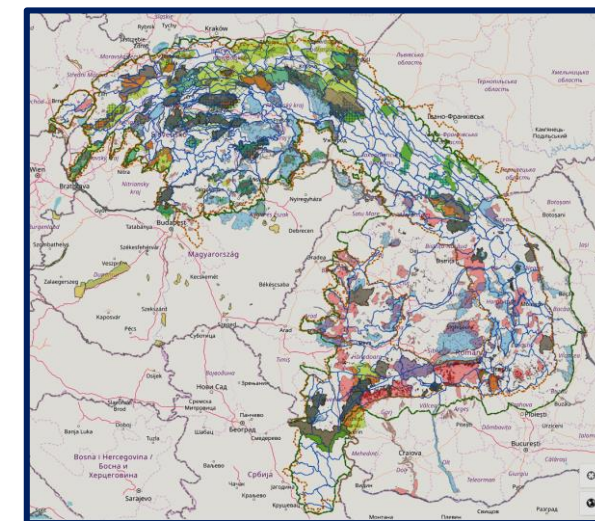
- **Seminars** (for institutions) and **trainings** (for local stakeholders)
- **e-learning course** with GI-related multimedia materials (**Anim, VR**)
- **geo-portal** and **mobile application** for field inventory, mapping, and assessment of green infrastructure
- **local green infrastructure case studies** (competition)
- **local informational-promotional campaigns**
- **manual** on protection and proper management of GI in Natura 2000 sites in the Carpathians
- **joint meeting of 3 Working Groups of the Carpathian Convention** (WG Biodiversity, WG Spatial Development, and WG SARD)??



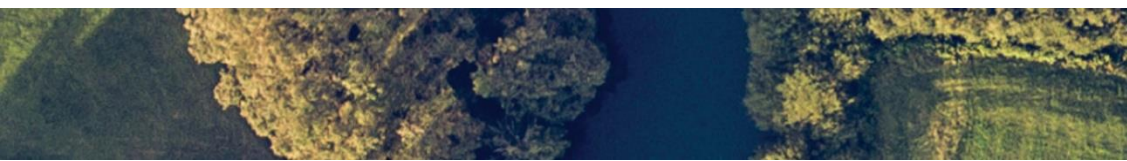
Request for assistance – monitoring GI „state of affairs” across the whole Carpathian region

- current state, distribution and functioning of GI in other Carpathian countries
- GI-related initiatives (gov., science, NGOs etc.).

www.zielonainfrastruktura.karpatylacza.pl/questionnaire



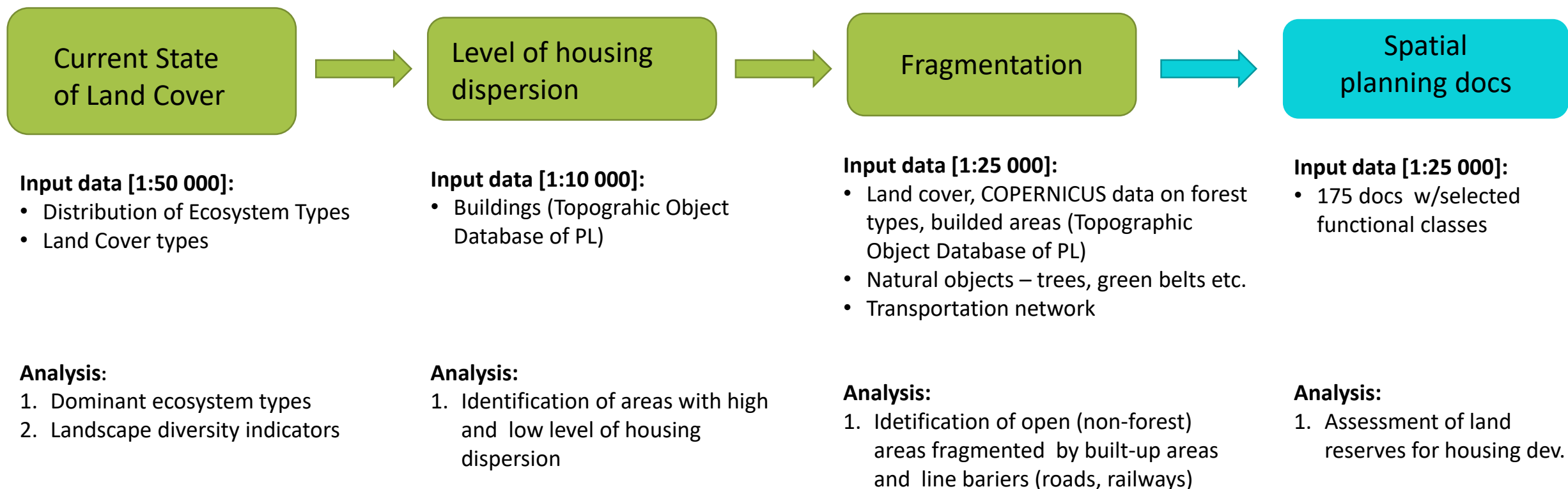
Source: www.ccbis.org



2.

Spatial analysis of conditions for Green Infrastructure development in Polish Carpathians

Scope / Stages



Distribution of ecosystem types in PL Carpathians

 Surface waters

 Wetlands

 Grasslands, tall herbs


 Heathland, dwarf shrubs

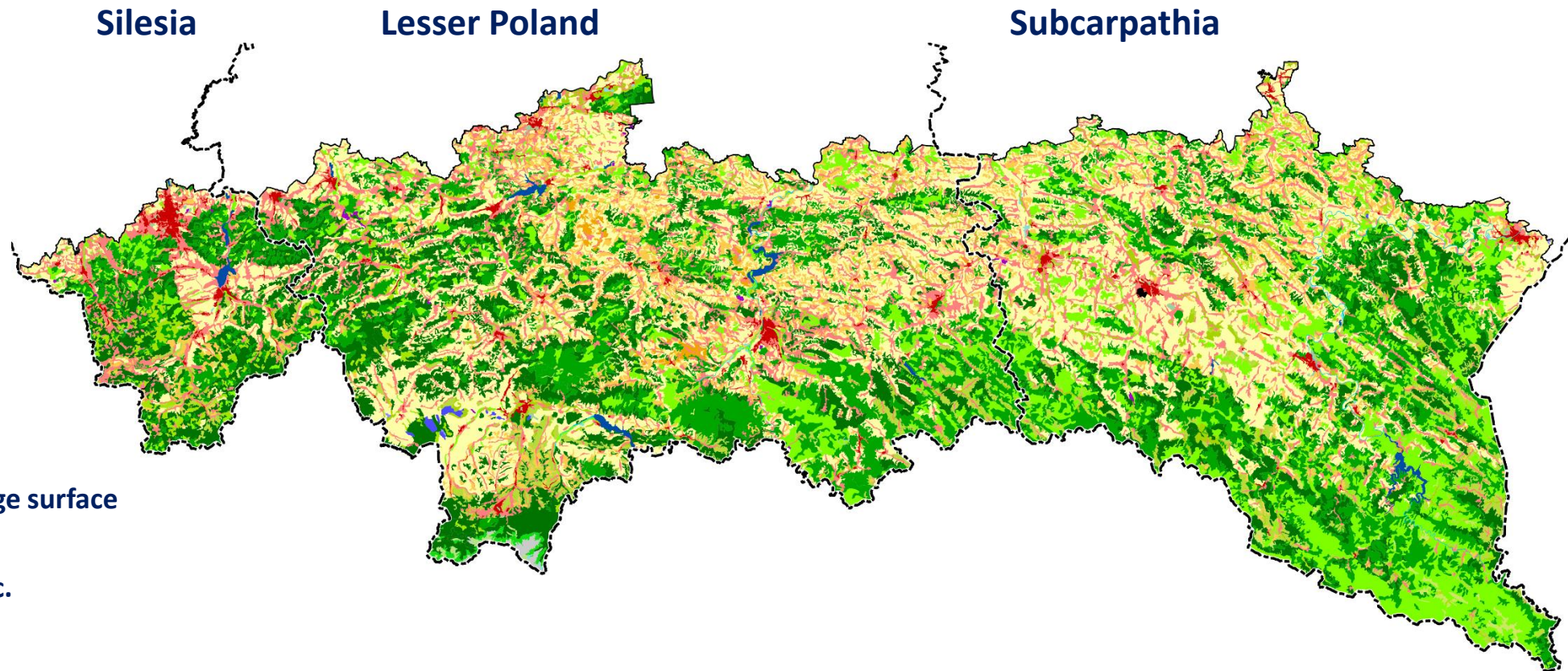
 Forests / woodlands

 Orchards

 Rocks, screes

 Agro-ecosystems (mosaic / large surface)

 Anthropogenic ecosystems (inc. GI in cities)





Landscape diversity – aggregated land cover classification

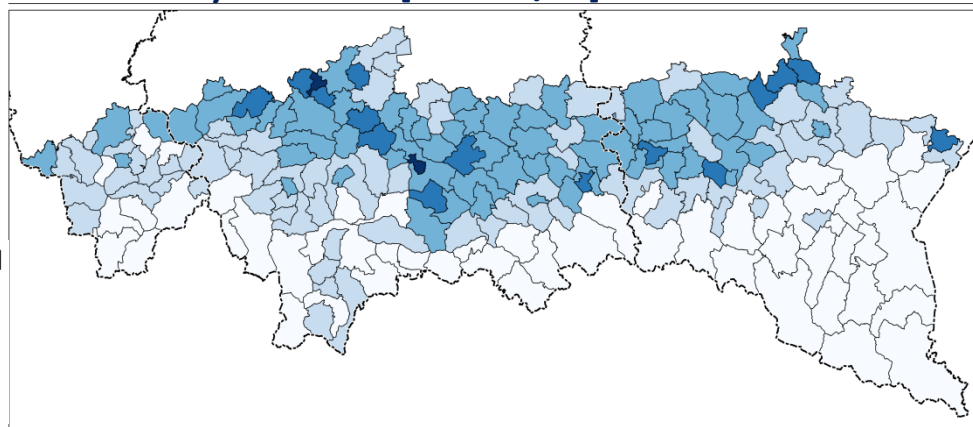
Class code	Description
LZ	Forests, woodlands
RK	Shrubs
UT	Permanent crops (orchards, plantations, allotment gardens, plant nurseries etc.)
UZ	Agricultural lands – meadows and pastures
GO	Agricultural lands – arable (ploughed) fields
WP	Surface waters – standing and running
ZAB	Built-up areas
TA	Other anthropogenic areas (non-built-up, transport infrastructure, squares, Surface excavation areas, landfills)
P	Screes and rocks

Aggregation of land cover classes from the Topographic Object Database, 10k

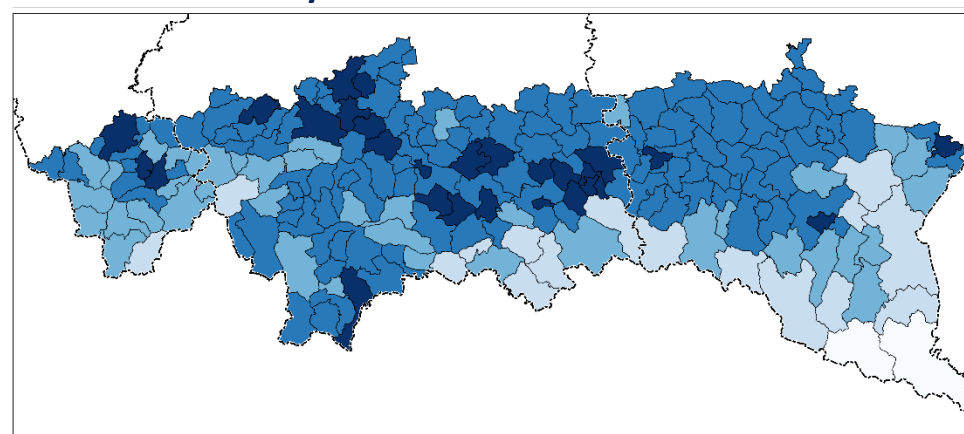


Landscape diversity – ind. values' distribution in communes

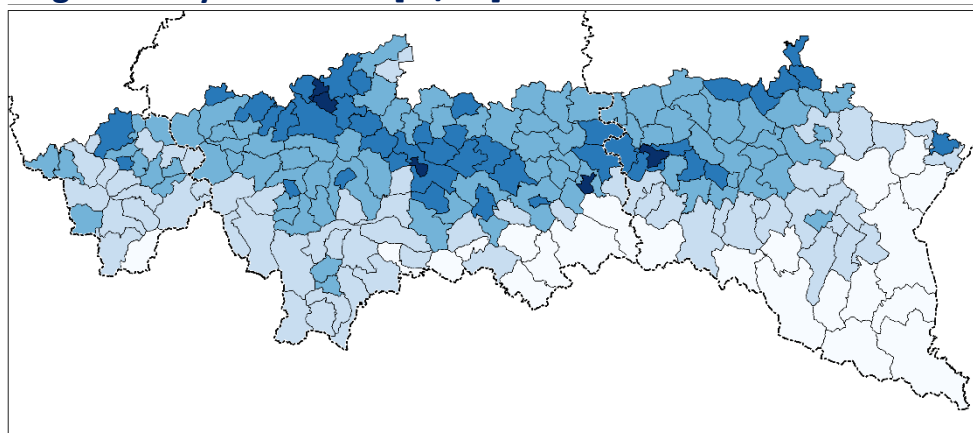
Patch Density Index - PD [number/ha]



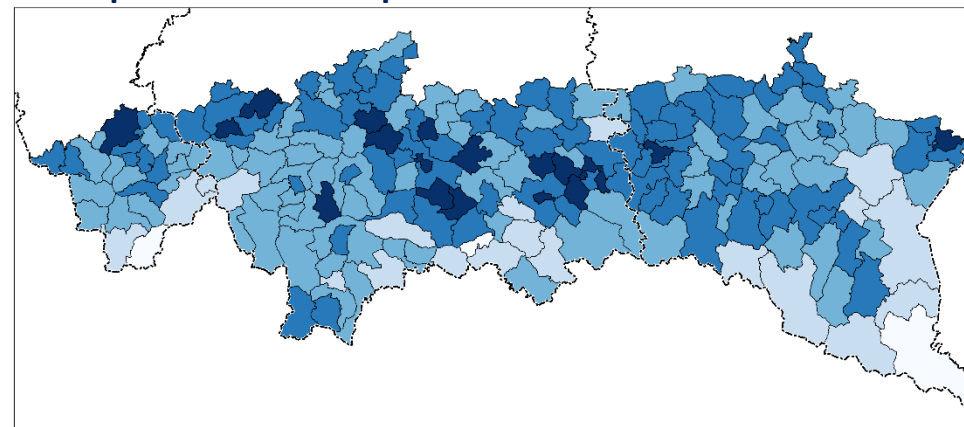
Shannon's Diversity Index - SHDI



Edge Density Index – ED [m/ha]



Interspersion and Juxtaposition Index - IJI



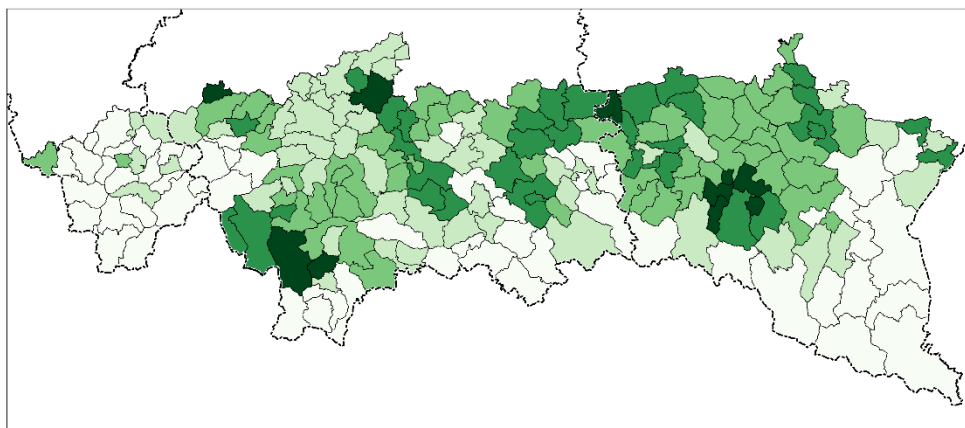
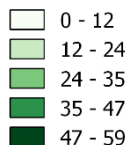


Land cover diversity – in communes

Share of arable fields in commune's area

%

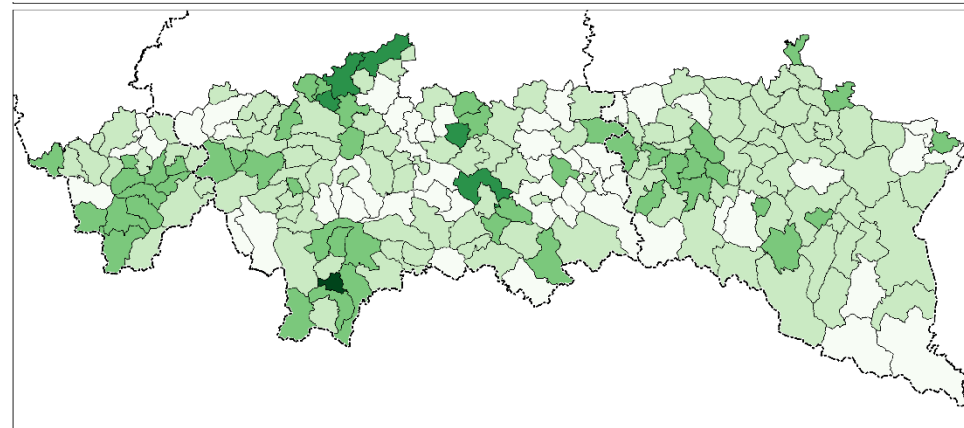
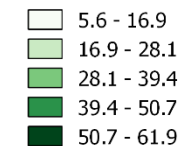
Udział gruntów ornych



Share of meadows/pastures in commune's area

%

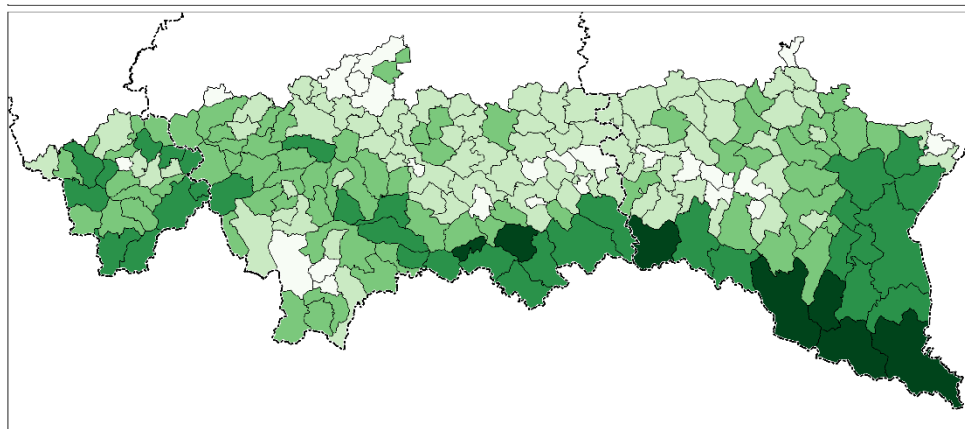
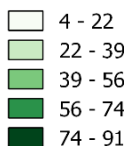
Udział użytków zielonych



Share of forests/woodlands in commune's area

%

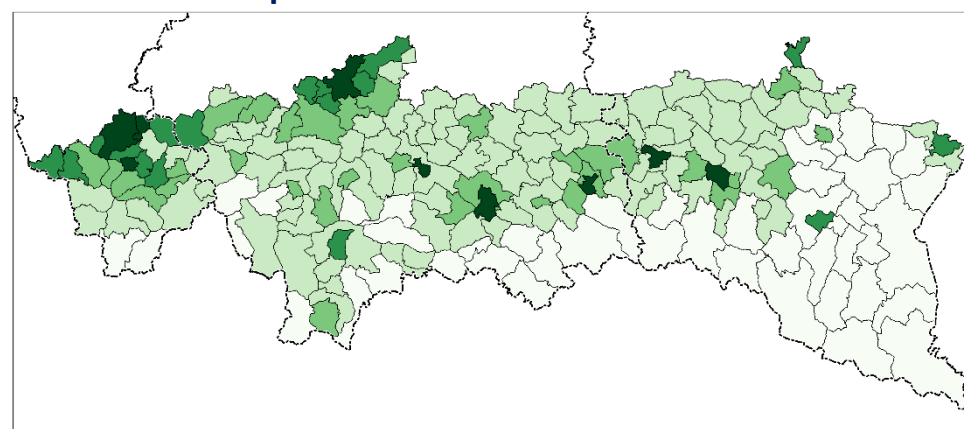
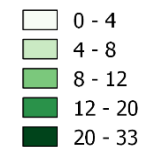
Udział lasów



Share of built-up areas in commune's area

%

Udział zabudowy





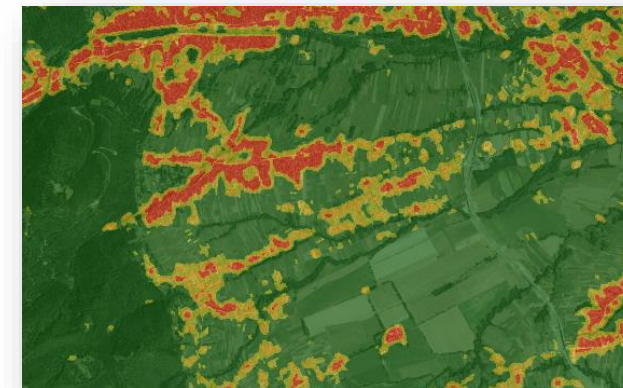
Analysis of fragmentation

Input data (usually at 10k)

- Forests
- Other woods, shrubs, alleys, single trees or groups of trees, hedges
- Built-up areas
- Nat. Highways

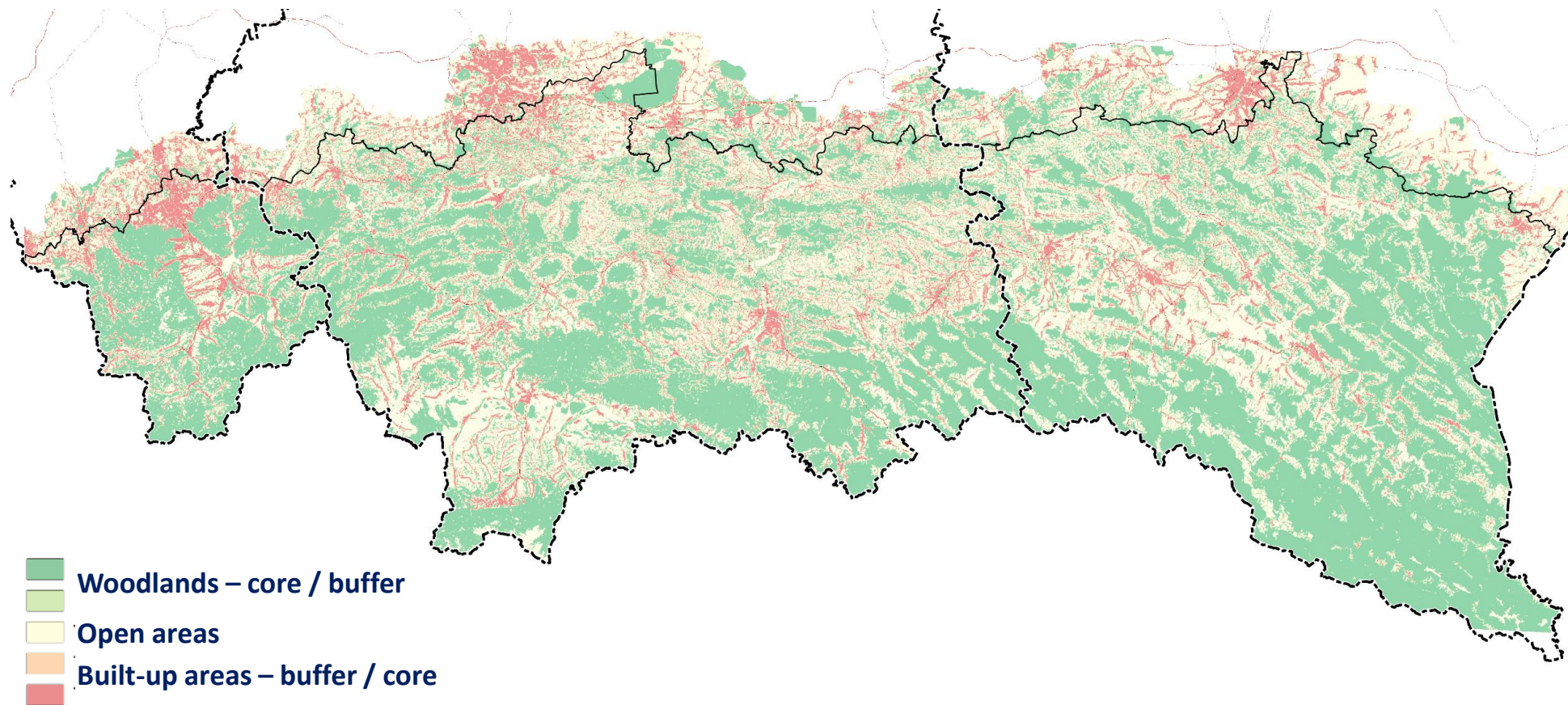
Analyses:

- Raster analysis using:
Focal Statistics, Euclidean Distance, Raster Calculator



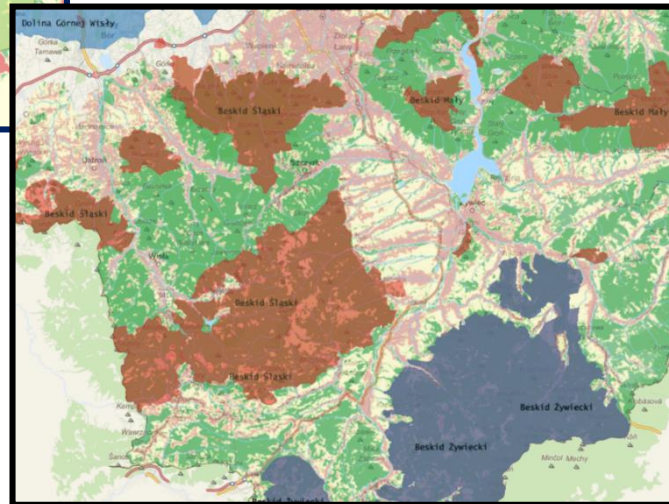
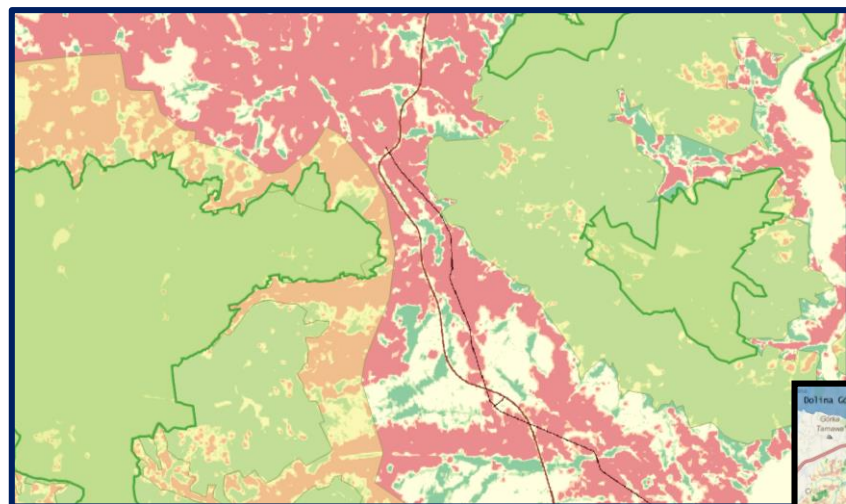


Analysis of fragmentation – results





Scrutinizing hotspots



- Isolating Natura 2000 sites
- Severing ecological corridors
- Degrading open areas

Importance of GI-friendly spatial planning



Analysis of building dispersion

Criterion for condensed:

aggregation of min. 5 buildings (with exception of buildings of purely auxiliary, non-housing character), with distances among them of up to 100 m

Input data:

- Buildings (Topo Obj. Dbase, 10k)

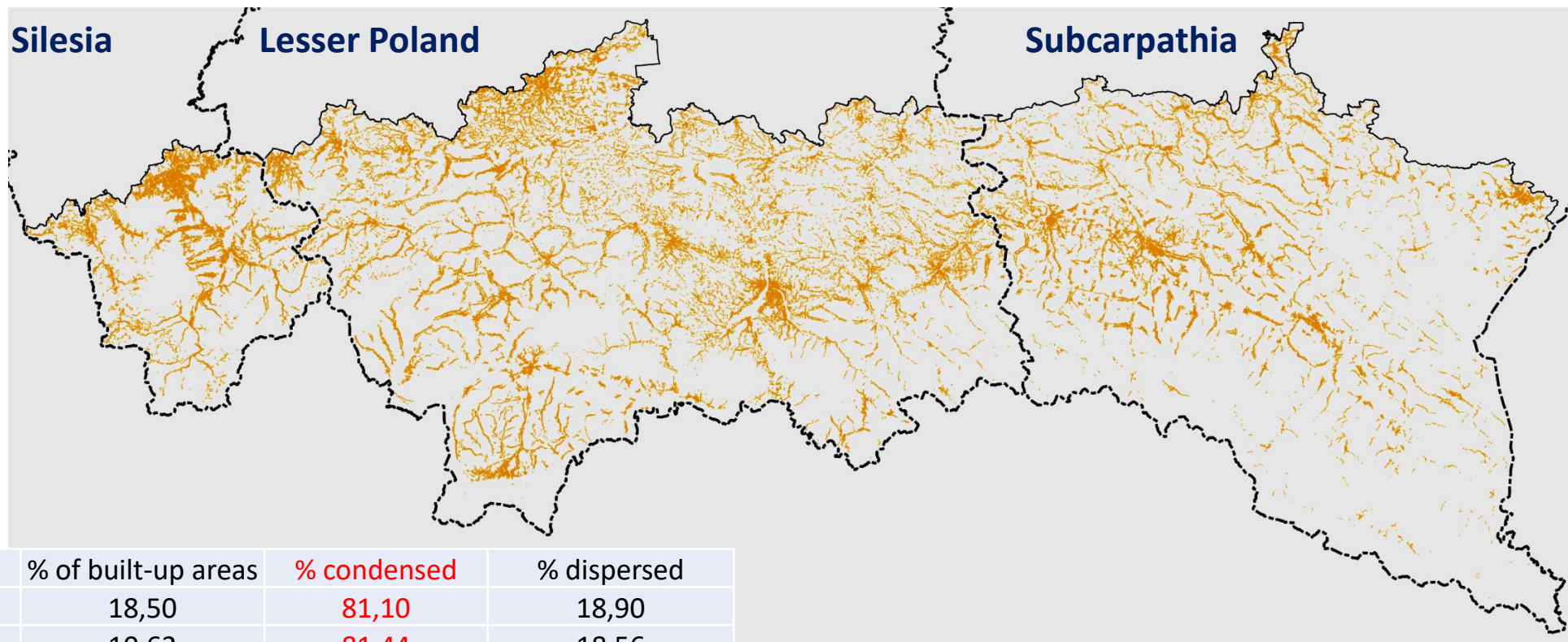
Analysis:

- Vector analysis using *Buffer*, *Spatial Join*





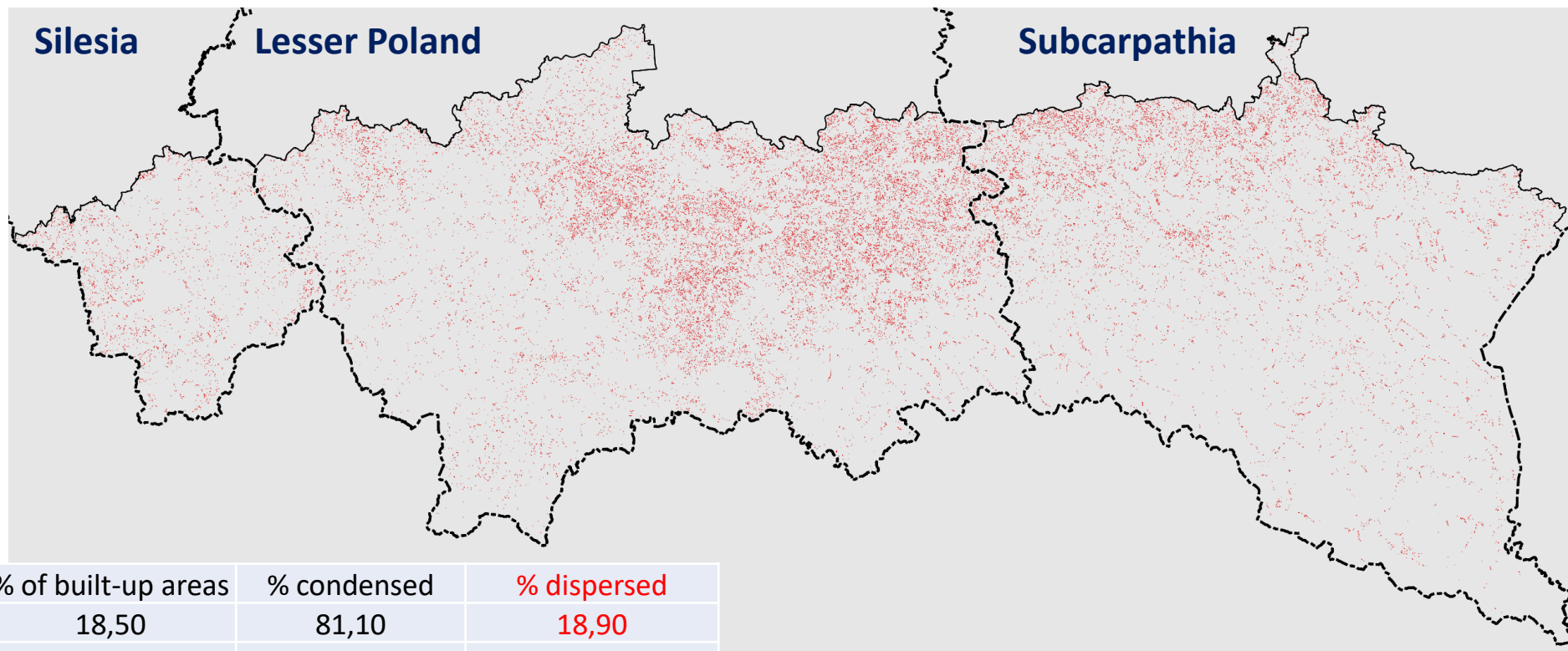
Building dispersion – condensed



	% of built-up areas	% condensed	% dispersed
Lesser Poland	18,50	81,10	18,90
Subcarpathia	10,62	81,44	18,56
Silesia	20,90	89,88	10,12
Carpathians PL	15,41	82,34	17,66



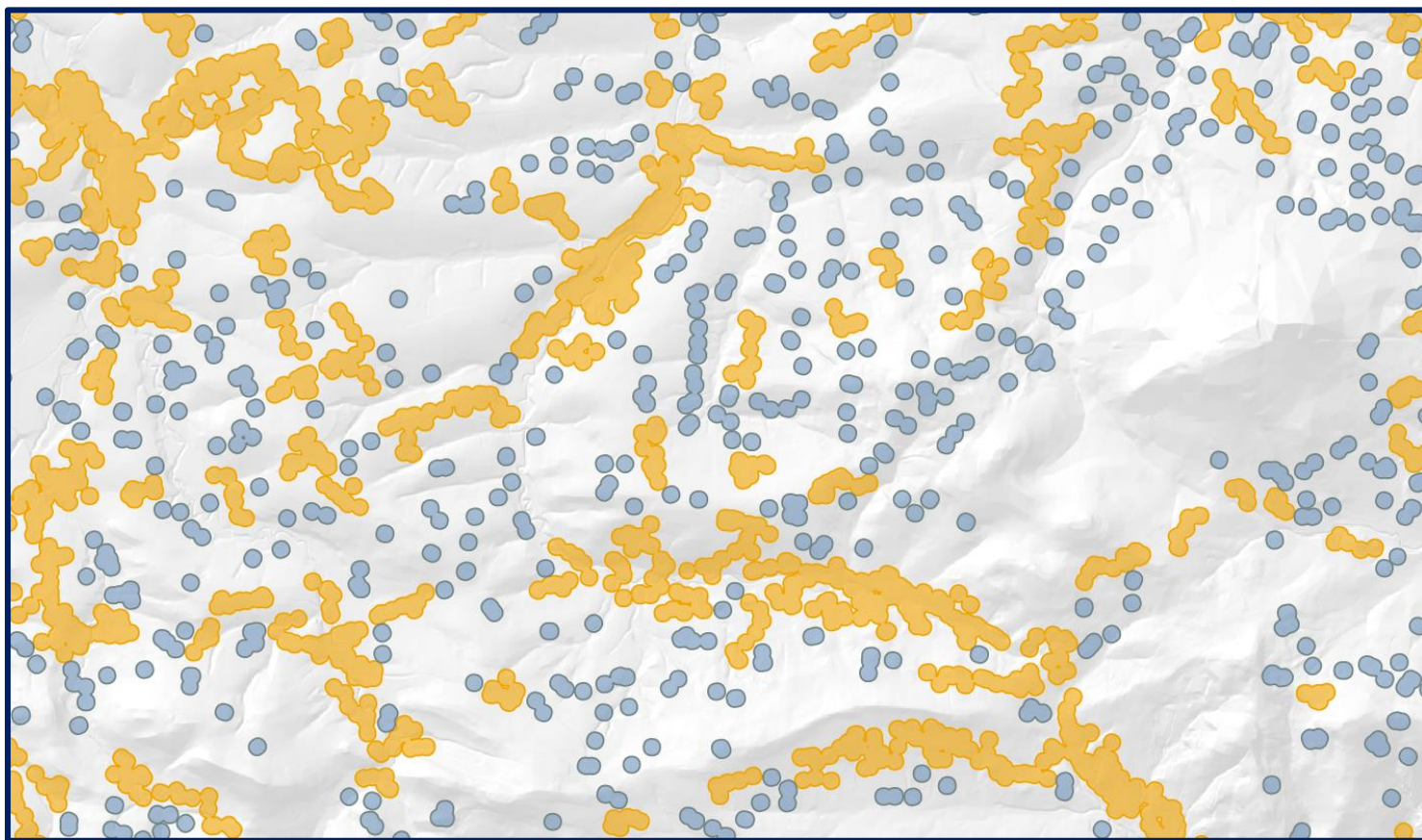
Building dispersion – dispersed



	% of built-up areas	% condensed	% dispersed
Lesser Poland	18,50	81,10	18,90
Subcarpathia	10,62	81,44	18,56
Silesia	20,90	89,88	10,12
Carpathians PL	15,41	82,34	17,66



Building dispersion



yellow - condensed
blue - dispersed

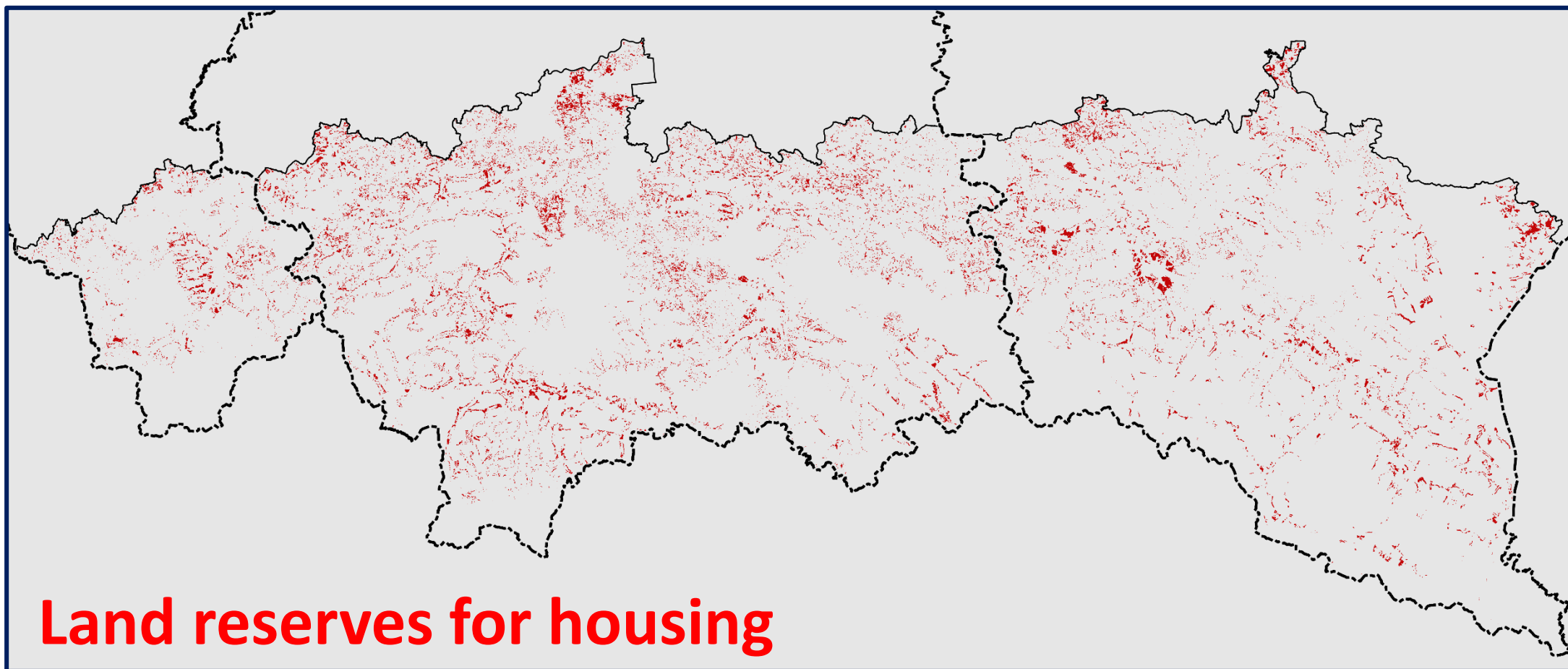


Analysis of communes' spatial planning documents

Class	Description
M	Residential housing (single-family, multi-family, tourism facilities, summer houses, etc.)
M, U	Mixed: residential and services, multi-functional zones
M, P	Mixed: residential and industrial buildings for commercial activities
U	Service areas / facilities
P	Industrial / commercial areas / facilities
P, U	Mixed: industrial / commercial / services
UT	Tourism and sports areas
KD	Areas allocated for projected (major) highways and expressways



Analysis of communes' spatial planning documents



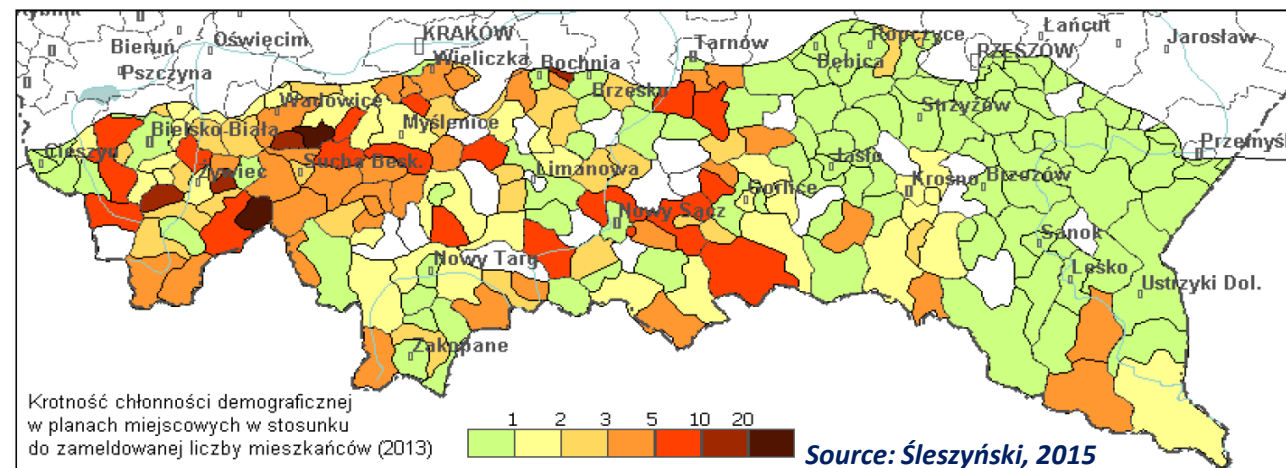
Analysis of communes' spatial planning documents



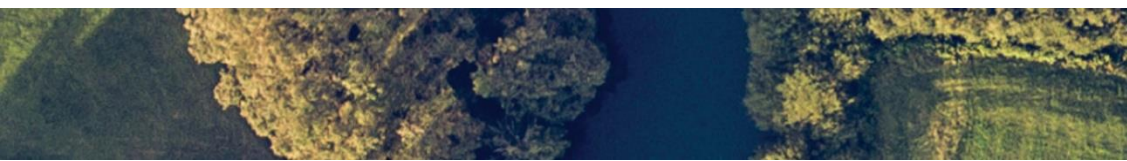
Land reserves for building up in spatial planning documents

- High investment pressure
- Fast rate of land allocation – oversupply of „investment lands”
- Lack of consideration for sound demographic and economic analyses

New building permits (red)
against existing housing
(yellow)



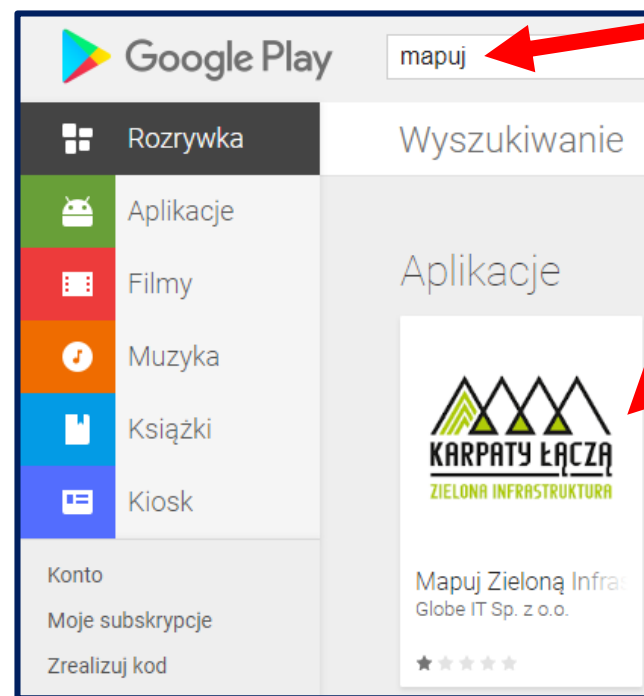
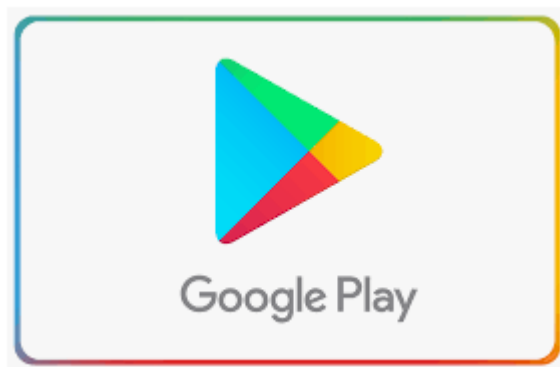
Multiplier of demographic absorption (projected population)



3.

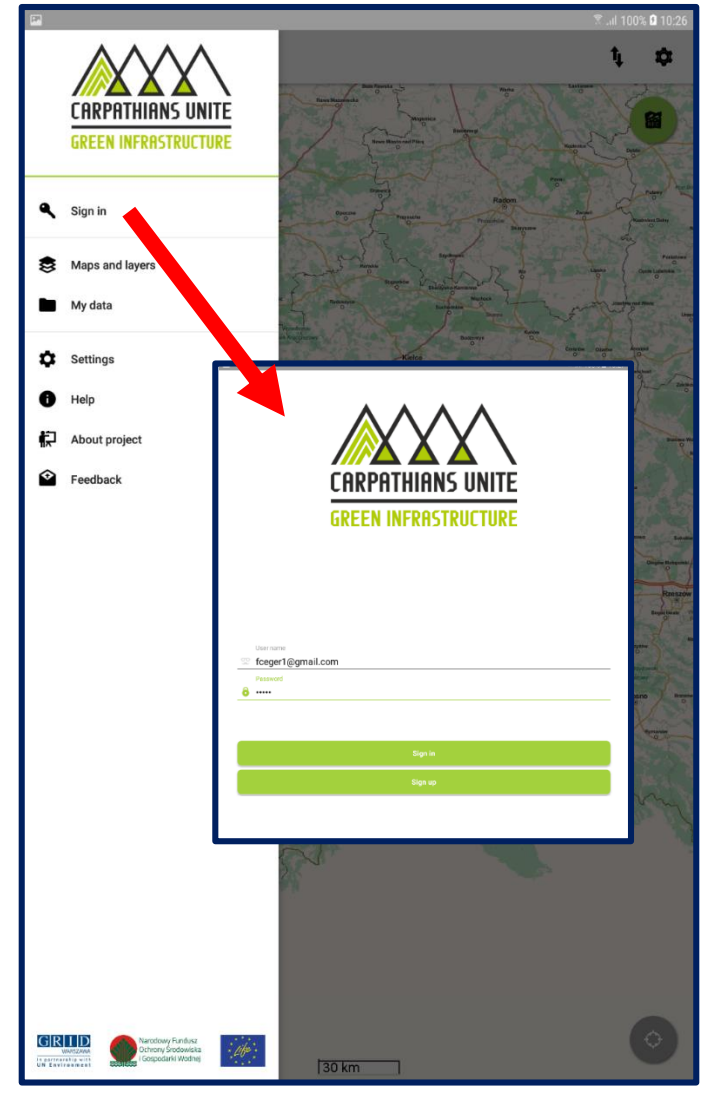
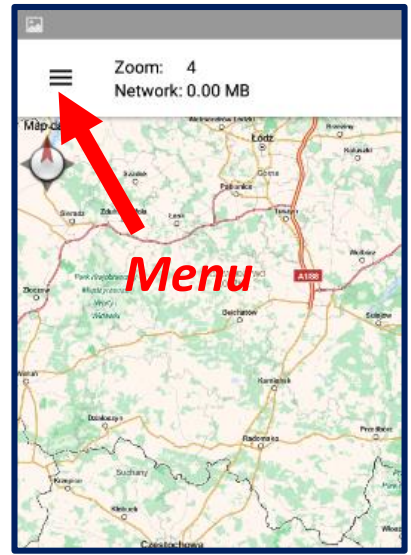
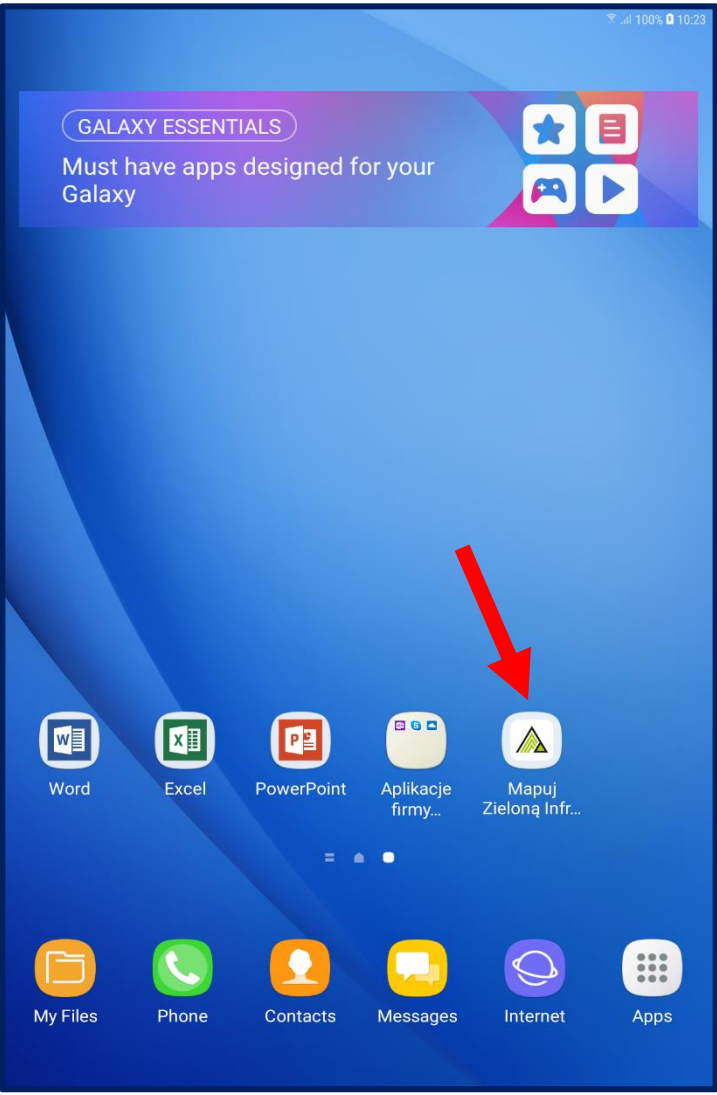
Demostration of geoinformation tools – the geoportal coupled with a mobile application – for Green Infrastructure inventory, mapping, and assessment

1. The mobile application



Search phrase: „mapuj” –

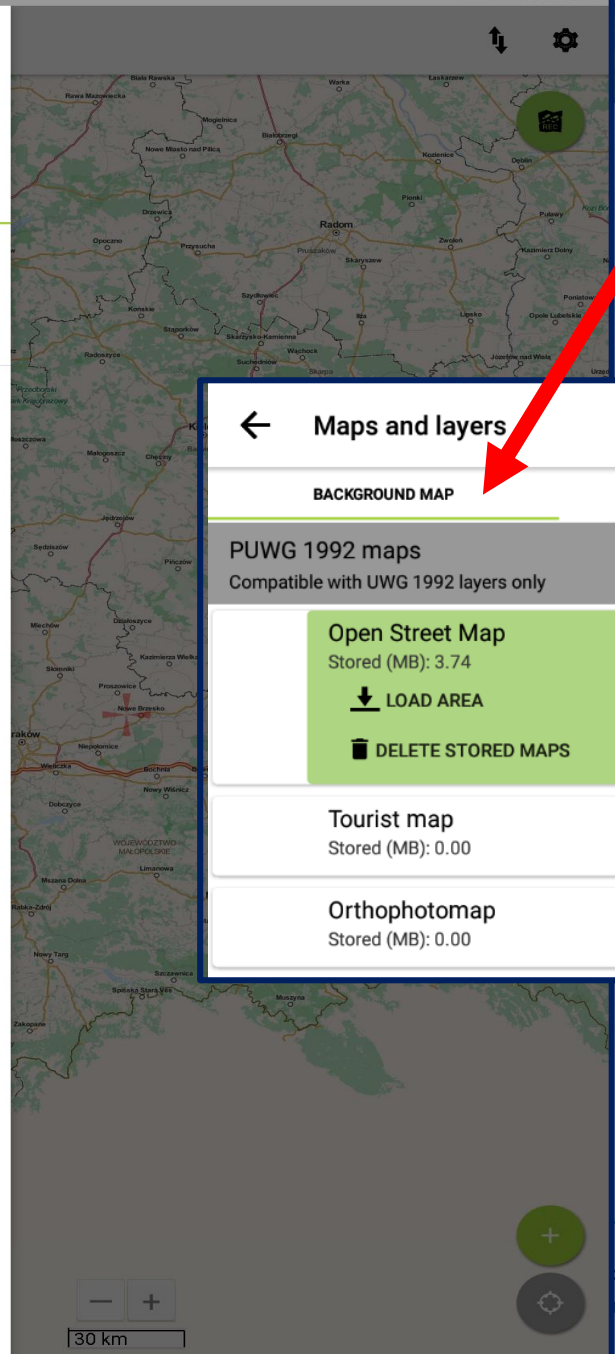
English language version of the application will be set automatically when the system language of the device is set to English.



Log in



- Welcome
fceger1@gmail.com
- Maps and layers
- My data
- Settings
- Help
- About project
- Feedback



- Selection:**
- background map
 - thematic layer (1 at a time)

← Maps and layers

BACKGROUND MAP	MAP LAYER	LEGENDS
PUWG 1992 maps Compatible with UWG 1992 layers only		
Open Street Map Stored (MB): 3.74 ↓ LOAD AREA 🗑️ DELETE STORED MAPS		
Tourist map Stored (MB): 0.00		
Orthophotomap Stored (MB): 0.00		

- Switch on/off by tapping
- Can be pre-loaded for offline use
- Polish PUWG 1992 coord. system

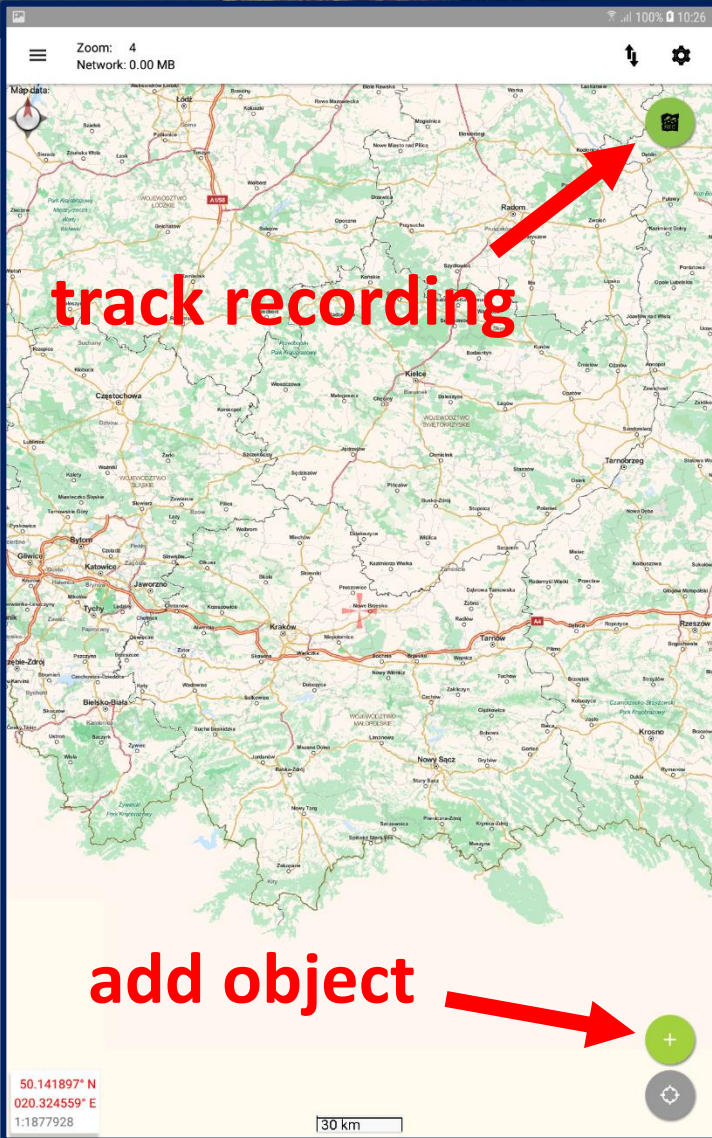
← Maps and layers

BACKGROUND MAP	MAP LAYER	LEGENDS
None		
PUWG 1992 layers PUWG 1992 base map is required		
Borders of Carp. Conv. communes Stored (MB): 0.00		
Green infrastructure Stored (MB): 0.00		
National parks Stored (MB): 0.00		
Landscape parks Stored (MB): 0.00 ↓ LOAD AREA 🗑️ DELETE STORED MAPS		
Reserves Stored (MB): 0.00		
Birds Directive Sites (SPA) Stored (MB): 0.00		
Habitats Directive Sites (SCI/SAC) Stored (MB): 0.00		
Protected landscape areas Stored (MB): 0.00		
Ecological sites Stored (MB): 0.00		
Nature-landscape sites Stored (MB): 0.00		
Nature monuments Stored (MB): 0.00		
National ecological corridors Stored (MB): 0.00		
Regional ecological corridors - Silesia Stored (MB): 0.00		
Total Stored (MB): 1.14		🗑️ DELETE STORED MAPS

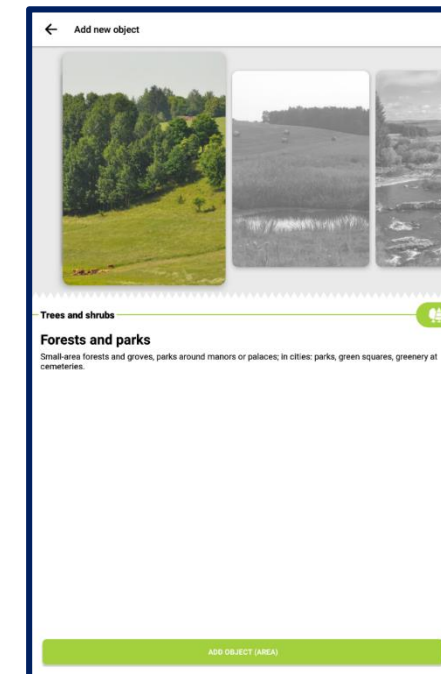
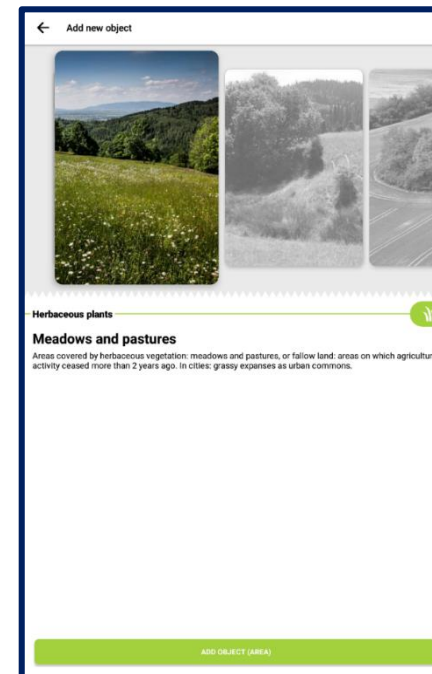
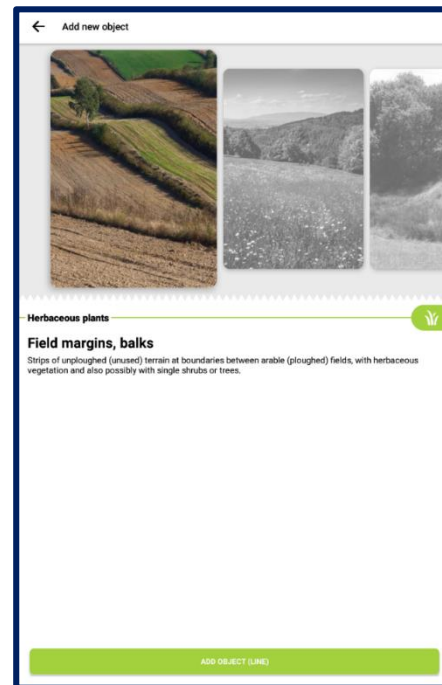


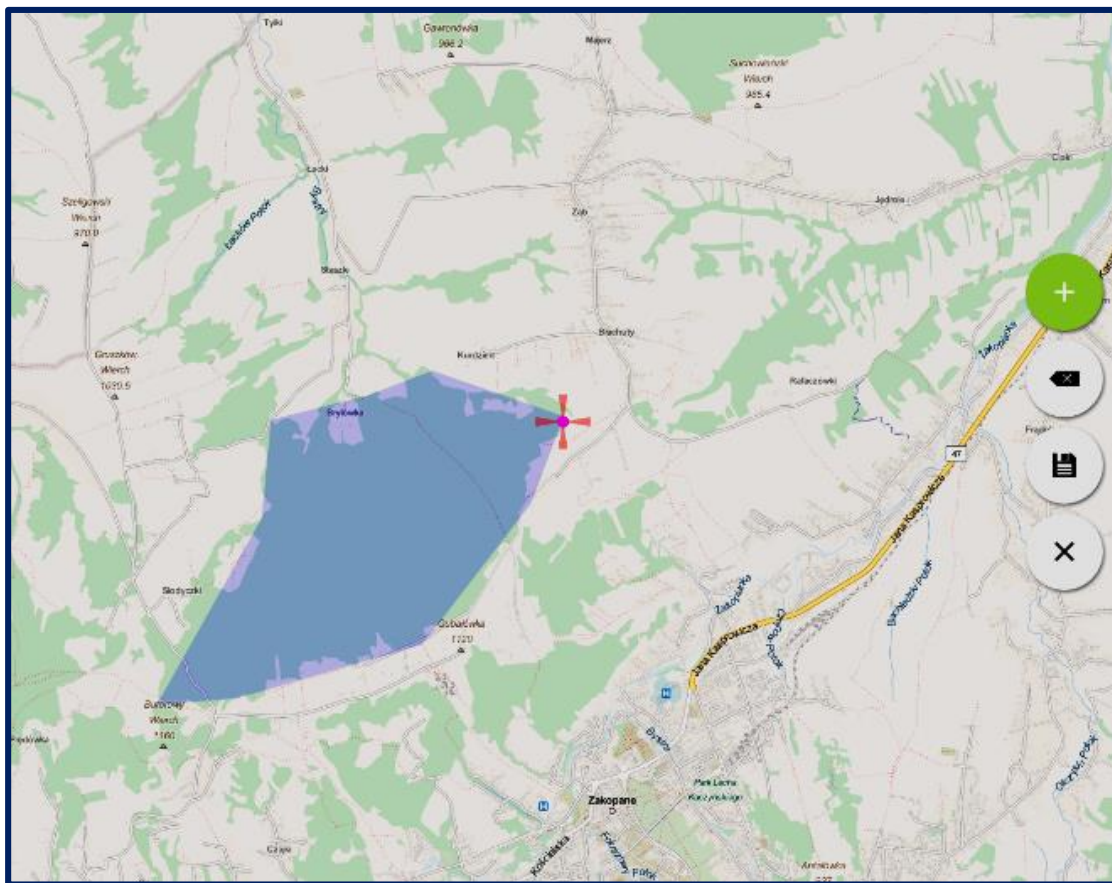
PL/000648 is co-financed by the European Union within the LIFE Programme and for Environmental Protection and Water Management





Slider selector of appropriate GI element.
Geometry (point, line, or polygon) set by default.





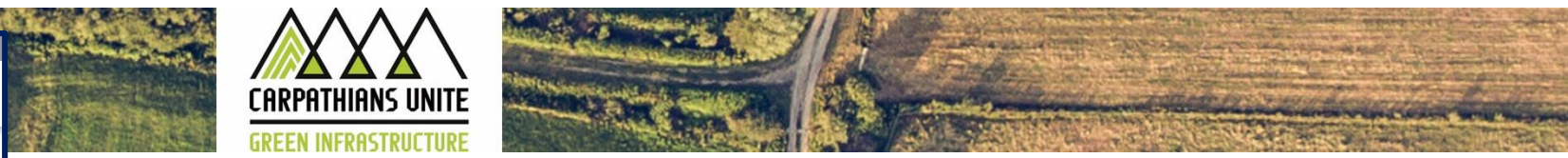
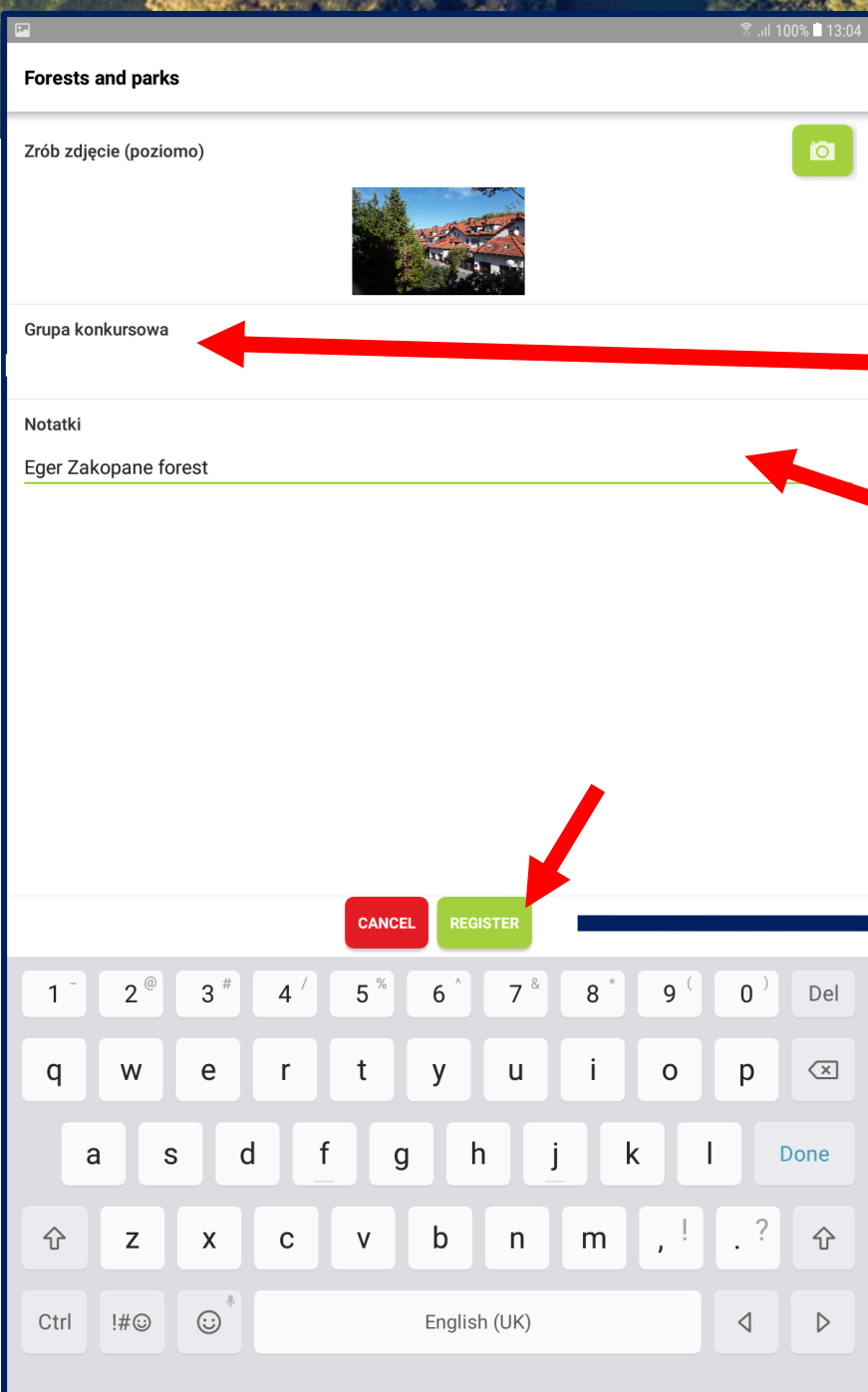
add point/vertex

edit/remove point/vertex

save object

quit/cancel

then...



Take a photo (horizontally)

**Select EGER or SZKOLENIE
(these are mock/exercise attributes)
please, do NOT select any of the other attributes.**

**Enter short note / object
description**

then...





CARPATHIANS UNITE

GREEN INFRASTRUCTURE



Welcome

fceger1@gmail.com



Maps and layers



My data



Settings



Help



About project



Feedback

← My data

Show

List

Field margins, balks (0)

Meadows and pastures (0)

Wetlands (0)

Groups of trees (0)

Groups of shrubs (0)

Rows of trees (0)

Rows of shrubs (0)

Orchards and allotment gardens (0)

Forests and parks (1)

Waterbodies (0)

Rivers and streams (0)

Ditches and canals (0)

Terrestrial wildlife crossings (0)

Water animal passageways (0)

Tracks (0)

Registered objects stored in My data (according to the selected category)

← Forests and parks

Show all

Title ascending

Eger Zakopane forest

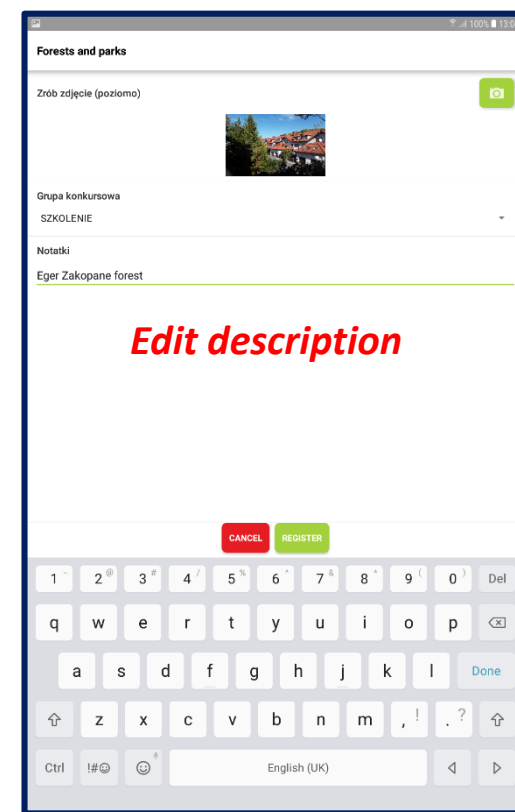
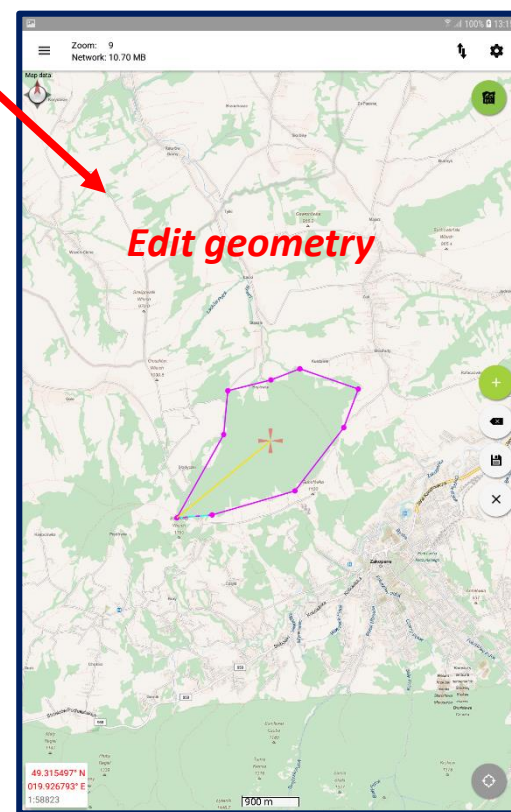
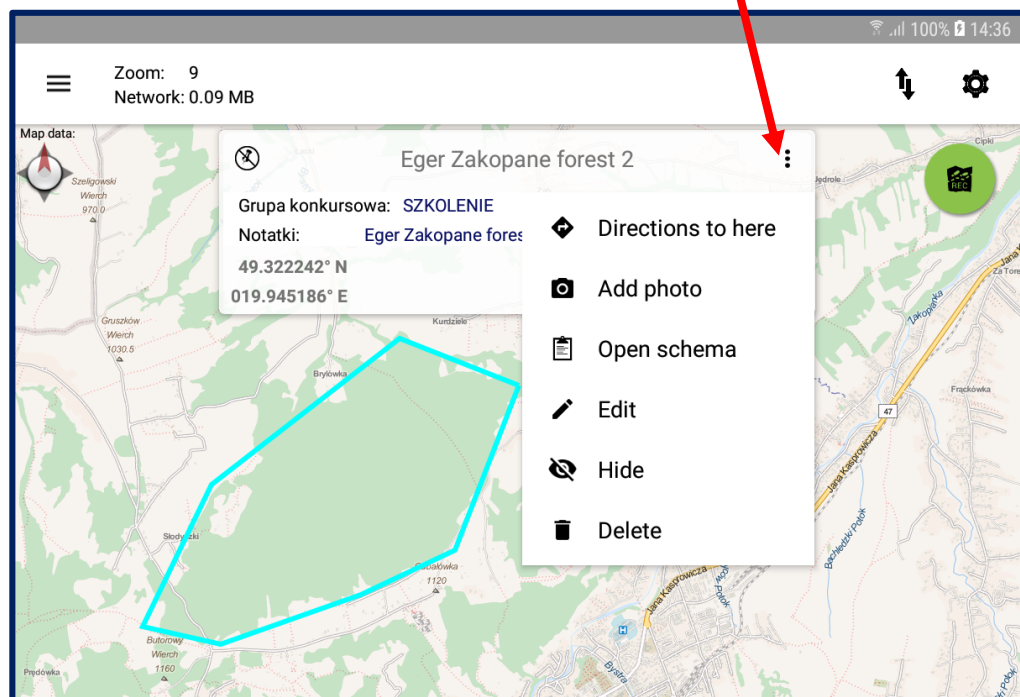
- Go to
- Open schema
- Edit
- Delete
- Mediafiler



Retro-edition of registered objects

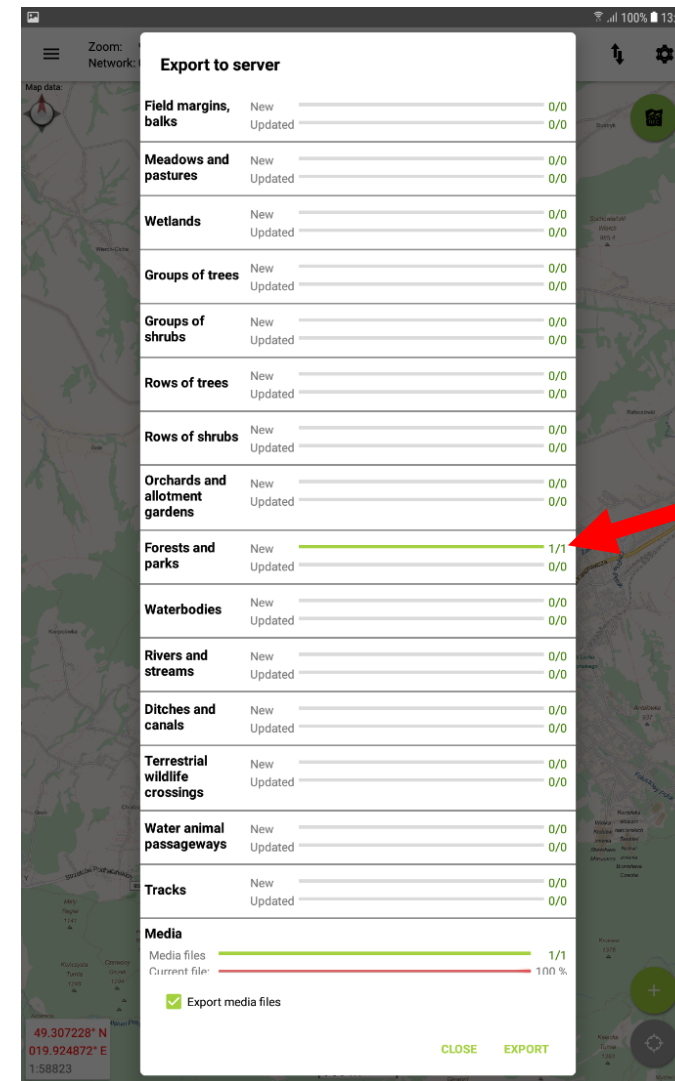
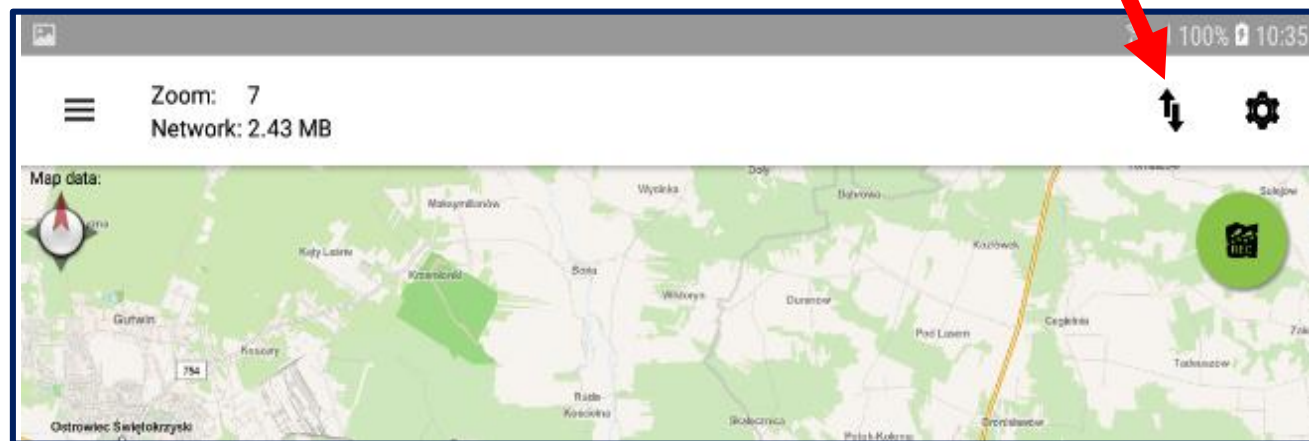
Edit functionality (plus navigation) also available after selecting/tapping an object on the map.

- Go to
- Open schema
- Edit
- Delete
- Mediafiler





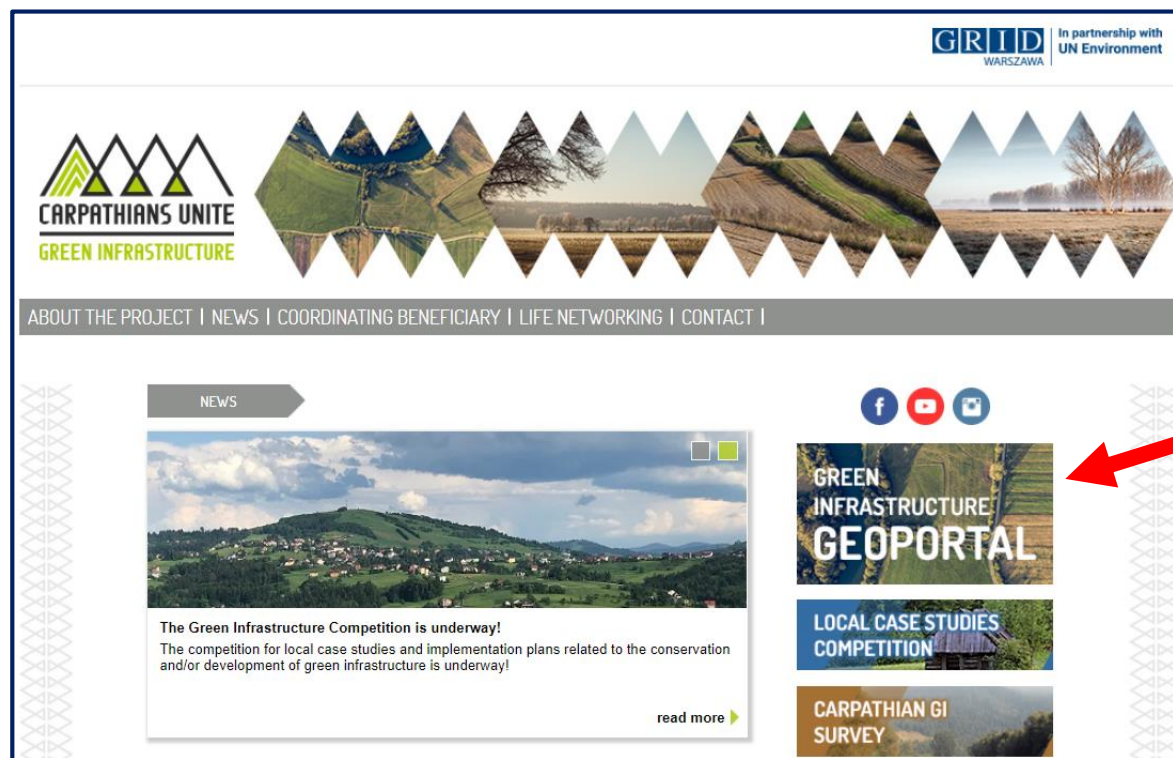
Data transfer (export / import) between the app and the geoportal



Transfer status indicator

2. The geoportal

<http://en.zielonainfrastruktura.karpatylacza.pl>



The screenshot shows the website's header with the GRID Warszawa logo and the Carpathians Unite Green Infrastructure logo. A navigation menu includes 'ABOUT THE PROJECT | NEWS | COORDINATING BENEFICIARY | LIFE NETWORKING | CONTACT |'. The main content area features a 'NEWS' section with a headline 'The Green Infrastructure Competition is underway!' and a 'GREEN INFRASTRUCTURE GEOPORTAL' section with a red arrow pointing to it. Other sections include 'LOCAL CASE STUDIES COMPETITION' and 'CARPATHIAN GI SURVEY'.

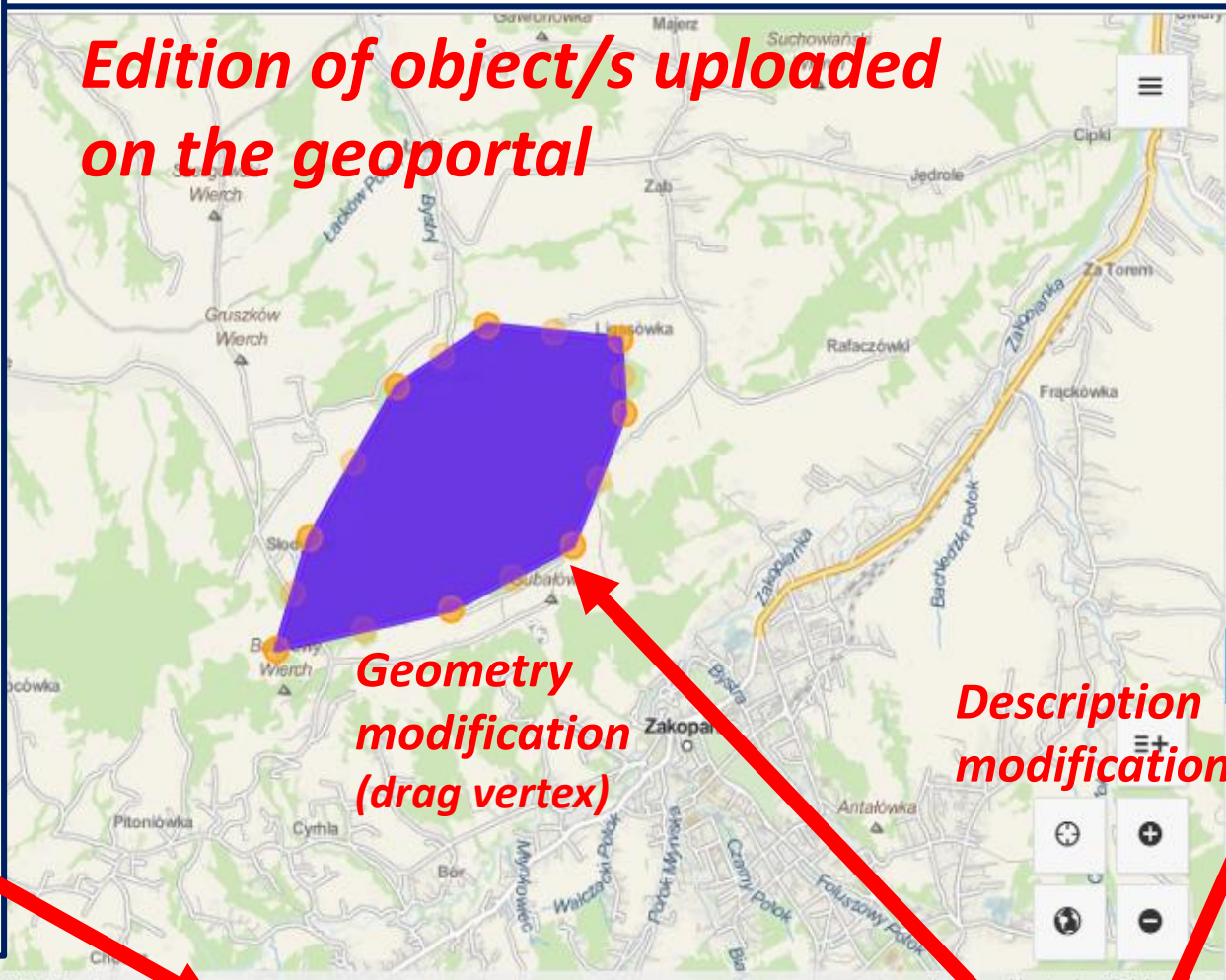


Log in using the same data as in the app.

Set language version

Layer Manager Pro Hide >

- Borders
- GI elements
- In-field balks
- Meadows and pastures
- Wetlands
- Groups of trees
- Groups of shrubs
- Rows of trees
- Rows of shrubs
- Orchards and allotments
- Forests and parks
- Waterbodies



Forests and parks Hide >


Show attachments (0) Export to PDF

Clone

Lasy i parki (Green-GO! Carpathians)

Id: 60

Zrób zdjęcie (poziomo):



Area (m²): 4076840.83

Grupa konkursowa: EGER

Notatki: Eger Zakopane forest

Save Close

EPSG:2180 N: 157855 E: 565017 Scale 1 : 50 000 Piotr Mikołajczyk

id	Area (m ²)	Grupa konkursowa	Notatki
60	4076840.83	EGER	Eger Zakopane forest

Filter Export Hide

Show only features visible in map

Total: 1, Selected: 1



Example analysis / scrutiny on the geoportal using the app-registered and uploaded GI object and other thematic data

The screenshot shows a web-based geoportal interface. The main map area displays a topographic map with various overlays, including a green hatched area representing a forest reserve. A search bar at the top left contains the text "Search content or add map". The bottom left corner has a "THEMATIC MAPS" and "BASEMAPS" menu. The bottom status bar shows coordinates (EPSG:2180, N: 162082 E: 569191), scale (1:50 000), and the user name "Piotr Mikołajczyk".

On the right side, there is a "Layer Manager Pro" panel with a list of layers:

- Regional ecological corrid...
- Ecological network - Lesse...
- Regional ecological corrid...
- Potential directions of mig...
- Ecosystem types
- Landscape indices
- Existing built-up areas
- Scattered housing
- Condensed housing
- Spatial management policy
- Built-up land reserves
- Built-up land reserves (are...
- Ecosystems of built-up are...
- Provisions in commune sp...

Below the map, there is a table with the following data:

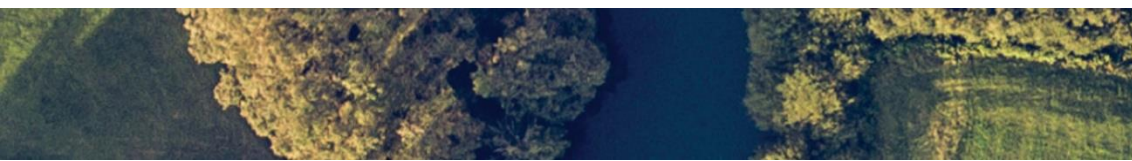
id	Area (m ²)	Grupa konkursowa	Notatki
60	4060606.6	EGER	Eger Zakopane forest

At the bottom of the table, there is a checkbox "Show only features visible in map" and a status "Total: 1, Selected: 0".



4.

Multimedia for GI awareness building



ABOUT THE PROJECT | NEWS | COORDINATING BENEFICIARY | LIFE NETWORKING | CONTACT |

NEWS



Mobile application for field mapping of green infrastructure
We encourage to venture outdoors and engage in mapping green infrastructure elements in your surroundings!

[read more](#)

GENERAL



Local initiatives for deployment of green infrastructure within Natura 2000 sites in the Carpathians (Green-Go! Carpathians / Carpathians Unite -...)

[read more](#)

GALLERY



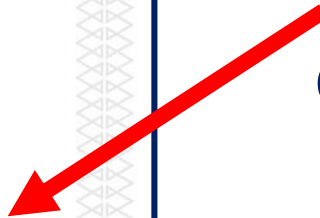
LOCAL CASE STUDIES COMPETITION

CARPATHIAN GI SURVEY

KNOWLEDGE BASE

CARPATHIAN INFORMATORIUM

KNOWLEDGE BASE e-Learning platform





Application / putting into practice

- **Planners (local GI spatial databases)**
- **Decision makers / policy makers**
- **Crowdsourcing / citizen science / community engagement (NGOs, school projects, local entrepreneurs...)**
- **Nature protection institutions**
- **... ???**



THANK YOU !! 😊

Piotr Mikołajczyk PhD

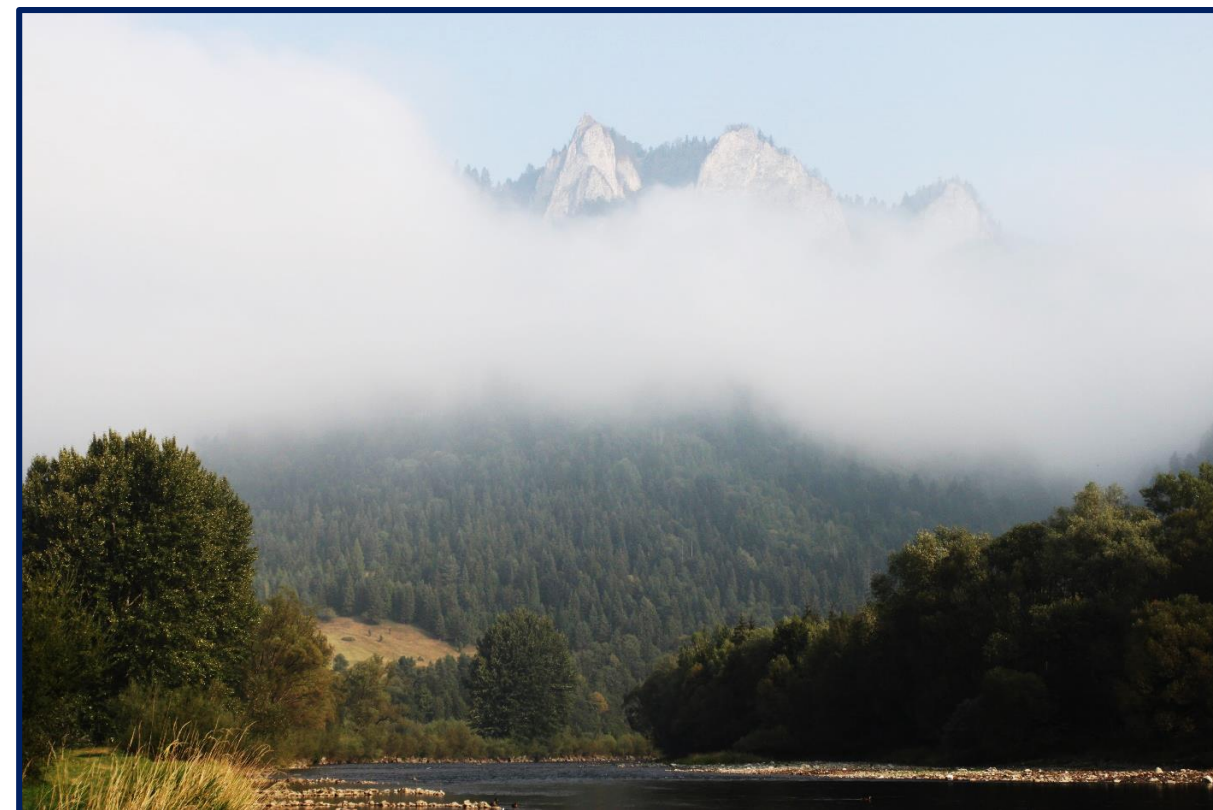
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