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# FIELD-MAPPING OF SERVICES AND PUBLIC BENEFITS OF GI – METHODOLOGY DEVELOPMENT AND EXPERIENCES FROM THE CASE STUDY AREAS TRI-BORDER REGION CZ-DE-PL AND DÜBENER HEIDE NATURE PARK, GERMANY

*MaGICLandscapes Work Package 2 is focussing on green infrastructure (GI) functionality assessment. One of the challenging objectives is to develop and test a field-mapping methodology for GI and its services, which is easy to use, able to close gaps in existing GI-datasets and can be applied in other regions.*

The 3rd project Work Package deals with public benefits of GI that can result from the provision of specific ecosystem services (ES). The aims are to develop a tool for the assessment of public benefits and to draw up action plans or strategies for selected areas on how to increase, protect and deliver these benefits.

Connecting both Work Package 2 and 3 is very useful, which means to develop a methodology/tool for mapping both the ecosystem services and public benefits in areas for which action plans and strategies will be produced.

The MaGICLandscapes project partner Leibniz Institute of Ecological Urban and Regional Development (IOER) already has extensive experiences regarding GI and ecosystem services (ES), developed ES indicators and has conducted GI and ES field-surveys. The Saxon-Czech project BIDELIN elaborates similar topics in the urban context. MaGICLandscapes and BIDELIN staff at IOER developed a field mapping methodology for the assessment of GI and ES in cooperation with experts in the field of landscape planning and landscape ecology as well as Applied Geoinformatics and Remote Sensing department at Anhalt University of Applied Sciences in Bernburg (DE).

This methodology was tested in a German-Czech student course “Values of ecosystem services, biodiversity and blue-green infrastructure in cities” in the Czech city of Děčín on October 2018.

Left: Mapping of Green Infrastructure in the Tri-Border Region | Photo: Henriette John; right: Erosion-prone agricultural areas around Spitzkunnersdorf in Upper Lusatia | Photo: Anne Sophie Grieser

With the developed mapping sheet a number of parameters were queried, such as the accessibility of a green space or existing facilities for leisure activities and recreation, which are focused on the assessment of cultural services and benefits. Other parameters were for example the overall share of green space or the vegetation structure, which are focused more on regulation services and the resulting benefits.

The mapping in Děčín was followed by the assessment of ecosystem services and potential benefits, based on the collected field-data. For the four selected ecosystem services Recreation, Cultural Heritage, Habitat Value and Climate Regulation students and experts developed an index-based methodology to determine the value of a particular green space to provide the specific service and therefore generate benefits for the public. Maps illustrating how areas with low and high values are distributed were produced. These maps proved to be very helpful in identifying localities/areas for action to increase the public benefit (PB) delivered by GI.

The results of the test-mapping demonstrated that the methodology is very useful for the tasks of MaGICLandscapes, and especially applicable to cities or smaller settlements, which are important land use components in several of MaGICLandscapes' case study areas. An evaluation of the mapping sheet by the students and experts on the usability in general as well as on the type and scope of the parameters and their usability for the ES and PB assessment provided important information for the improvement and adaptation of the methodology to the work packages of MaGICLandscapes. According to the evaluation, for example, aesthetic aspects such as the presence of long-distance views have been added. In addition, a query regarding the occurrence of edible plants and fungi was included to take account of provisioning services of GI as well. The application of the improved and adapted methodology are being applied in the case study areas Tri-Border Region Czech Republic, Germany and Poland and in Dübener Heide Nature Park, Germany, in close cooperation with project partner Saxon Foundation for Nature and Environment. Within the framework of an internship at IOER and as a basis for their bachelor thesis, two students of Ecology and Environmental Protection from the University of Applied Sciences Zittau/Görlitz are carrying out the mapping. In summer a Czech ERASMUS student in the field of Landscape Restoration is supporting the mapping actions.


Above: Urban gardening initiative in Zittau requiring further development; below: River Mulde in Eilenburg with limited access to people | Photos: Anne Sophie Grieser

Focus areas for the mapping are localities with needs for new GI or improved GI to increase public benefits, thus localities for which action plans and/or strategies should be drawn up within the framework of WP3. These needs were identified through regional stakeholder workshops in the case study areas.

The Tri-Border Region focus areas are Zittau and Liberec where, in general, more green space is needed to enhance ES and therefore quality of life. Furthermore, GI and its connectivity needs to be improved in the agricultural areas of the case study area. The situation in the case study area Dübener Heide Nature Park, wich is rich in green infrastructure, is different. In particular, there is a need to allow the small towns and villages in the peripheral area of the case study area better access to the existing green space.

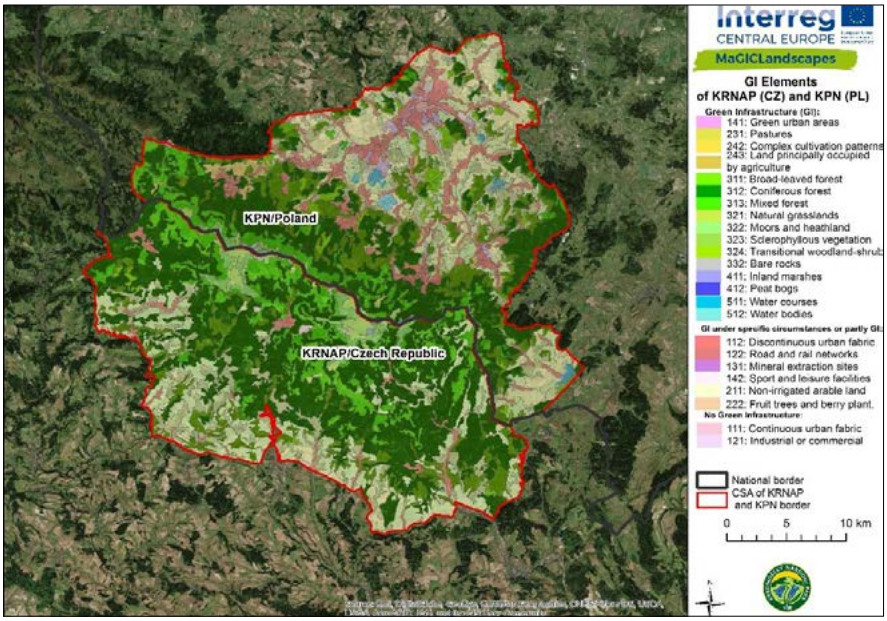
### GREEN INFRASTRUCTURE HANDBOOK AND MANUAL READY!

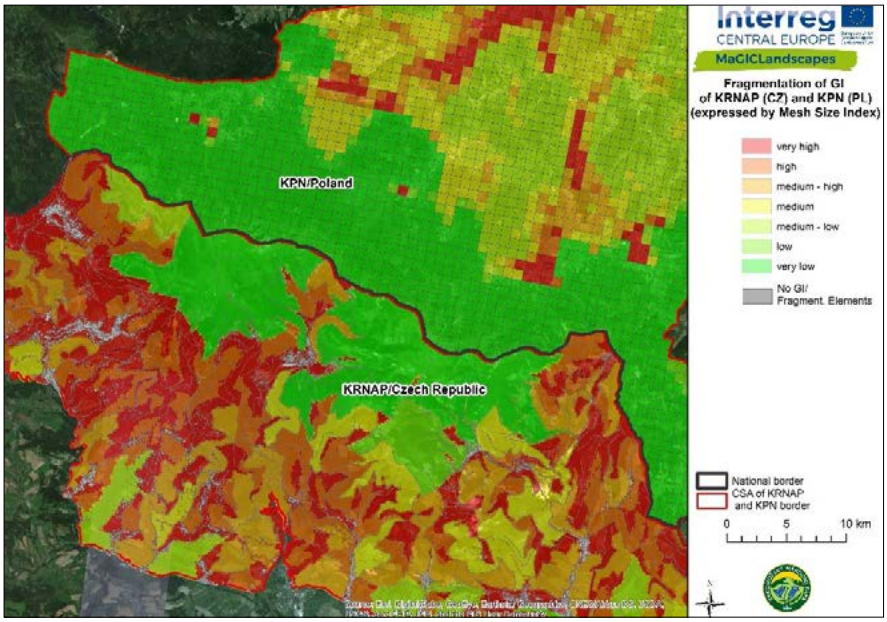
The transnational framework of green infrastructure assessment has been produced using the first project outputs of Work Package 1 available on the project website.

# NOT JUST PROTECTED AREAS: CROSS-BORDER GREEN INFRASTRUCTURE MANAGEMENT IN THE GIANT MOUNTAINS

*The Polish National Park Karkonosze (KPN) and its Czech counterpart Krkonoše (KRNAP) are active partners in the MaGICLandscapes project. Besides the daily legal duty of nature conservation, the mission of both partners is to investigate the conditions of green infrastructure (GI) in the cross-border national park area and beyond.*

The Giant Mountains are the highest mountains in the Czech Republic and some of the oldest in Central Europe. The Czech-Polish border straddles the highest peak of Sniežka/Sněžka located in the alpine vegetation zone and the very valuable subalpine peatbogs designated by the Ramsar convention. Along the border runs one of the busiest mountain trails, the so called Friendship Path. The use of the mountains by people over the last 500 years has significantly altered some of the natural landscapes. Krkonoše Mountains National Park on the Czech side was founded in 1963 and was the first Czech national park. The Karkonosze National park on Polish side was established earlier in 1959. Since 1992 both parks have been listed as a a UNESCO Biosphere Reserve.




Above: GI elements of Krkonoše/Karkonosze National Parks and their surroundings; below: Green infrastructure fragmentation caused by tourism activities | Maps: KRNAP

### *LOCAL GI ASSESSMENT*

The Czech and the Polish National Parks of the Giant Mountains contain some of the most biodiverse areas in the Czech Republic and Poland. Both sides of Giant Mountains are home to the same types of ecosystems, biotopes and green infrastructure (GI) elements, despite the different cultural historical uses of the area. Characteristically they contain highly diverse habitats and equally diverse species. The mountains are blanketed by various woodland types (broad-leaved, mixed and coniferous) and natural and semi-natural grasslands and pastures. The mountains are somewhat of an island surrounded by the cultural agricultural landscapes of the lowlands and foothills and thus have a very important ecological role in the transboundary region. This large area of GI performs many ecological functions and provides many ecosystem services. The administrations of both national parks have to consider multiple management issues, mainly because it is primarily a refuge/habitat for many rare and protected floral and faunal species but also because it is a destination for millions of visitors from across Europe.

To understand how this network of GI elements and the whole landscape functions and its condition KRNAP and KPN use several methods of GI assessment. The common approach of both national parks allows evaluation of the Giant Mts. and their surroundings as a one entity. The administrations of KRNAP/ KPN perform regular monitoring of each biotope. Moreover they

collaborate on several studies to evaluate of functionality of GI in these areas and adjoining regions. One of the most important topics is the connectivity of the landscape and GI elements. The Giant Mts. are a very important habitat and a migration corridor for rare mammals especially wolves, Eurasian lynx and many kinds of birds (the black grouse for example). Results of some analyses show, that both national parks play the role of core and/or hub in terms of landscape ecology and that the more problematic parts are those situated on the edges.

Also other types of analyses provide very interesting results. If we take in to account important factors such as tourism and traffic intensity, footpath network and other indexes the results can be very different.

The analyses enable the park admistrations to focus activities in the problem areas of the parks. KRNAP and KPN administrations perform not only desk based analyses and other studies, they also conduct field mapping and ground-works to protect and to care for important GI elements. Some of the most important GI elements in the area are the semi-natural grasslands and meadows, especially in the lower parts of mountains. Periodic grazing and mowing are important tools in helping to maintain and increase biodiversity of the grassland biotopes. Other important types of GI are the linear elements such as tree alleys and country lanes etc. Based on GI mapping and GI assessment the parks try to find most suitable places to improve the connectivity of GI. Improvement works include the planting of many indigenous trees. These GI and landscape elements provide not only ecosystem services (habitat, migration) but additional benefits too. Who wouldn‘t want fresh fruit during a walk?

### *COMMON MAJOR BENEFITS OF GREEN INFRASTRUCTURE*

The green infrastructure of the Giant Mts supports not only multiple ecosystem services but many benefits too, enjoyed by both holiday-makers and local communities alike. About 8 million people every year visit the parks. They come to see the magic landscapes of the mountains and the wildlife that lives there and to enjoy the clean air and good environmental conditions.

Tourism provides jobs for many people in the region. It is the main source of income for all municipalities of KRNAP and KPN. Tourism is the most important GI benefit for most of the local stakeholders, businesses and municipalities. However, it has a significant negative impact on the nature – i.e. disturbance of environment, decrease of many species, waste production, traffic and much more. During our meetings and other workshops with local stakeholders we try to discuss these problems and find the solution(s). Many stakeholders recognise that tourism is not only a benefit but it can also be a problem. We try to regulate it, to direct people in the field and to educate them.

Bilateral meeting regarding the assessment of GI in the Giant Mountains case study areas | Photo: KRNAP

www.kpnmab.pl
www.krnap.cz

Left: The landscape managers of mountain meadows | Photo: KRNAP/LIFE Corcontica; right: Tree planting to increase connectivity, enhance landscape character and provide additional ecosystem services | Photo: KRNAP

# 4TH PARTNER MEETING IN TURIN ON 14TH AND 15TH OF MAY 2019

*Over two days MaGICLandscapes project partners reviewed together the achievements and experiences gained so far. They agreed upon the implementation of upcoming tasks to complete the assessment of services and functions of local elements of green infrastructure. Based on these results they will produce first drafts of strategic action plans to enhance the GI network in the nine case study areas.*

To assess the functionality of existing GI elements at local level all partners used the tools provided by Graphical User Interface for the Description of image Objects and their Shapes (GUIDOS) by the European Commission's Joint Research Centre.

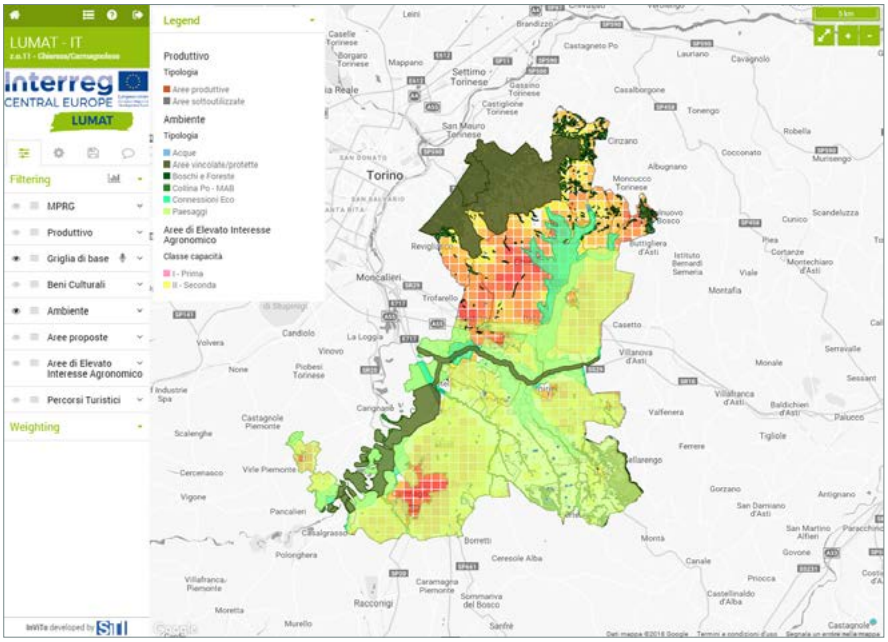
Based on CORINE Land Cover and regional land use and biotope maps partners applied the Morphological Spatial Pattern Analysis (MSPA) to extract information about how the GI patches are connected and where there is potential to connect two or more elements with each other e.g. to create a new ecological corridors, nodes and/or core areas. After that they processed the Euclidean Distance analysis to get an overview of intactness, shape and spatial arrangement of GI patches on a binary map (GI/not GI). In addition throughout the summer months extended field mapping activities are taking place in each case study area to record the ecosystem services provided in the selected focus areas.

Based on ecosystem services in the field and the needs of regional stakeholders for GI identified during personal consultations or workshops the local GI strategies and action plans will be developed. Within them measures and recommendations could both refer to a single GI element which needs to be created on a particular site e.g. to prevent flooding and to a more spatial approach at a wider scale e.g. for a whole community and/or region to improve the quality of GI and its benefits. Luigi Lariccia provided an insight to the Interreg Alpine Space Project LOS_DAMA! which strives for GI improvement in peri-urban areas throughout the Alps. He represents the Region of Piedmont which aims for a better integration of GI with inter-municipal structural planning. After exploring the willingness of regional public authorities, NGOs and scientific institutions to invest in GI and what specfiic actions could be realised a plan will be drawn up this year. The plan will provide an outlook on next steps and which GI projects can be implemented in the near future. The knowledge exchange between LOS_DAMA! and MaGICLandscapes is mainly taking place at the regional level in Piedmont and Vienna. MaGICLandscapes partners were also introduced to the Piedmont case study areas in the peri-urban area surrounding Turin, around the town of Chieri and in the Upper Po Plain. During the field trips local stakeholders talked about the needs for green infrastructure in these areas and about existing GI projects which demonstrate good practice and are perfect examples for future measures and activities to improve the local GI network.

Impressions from the 4th MaGICLandscapes Partner Meeting in Turin | Photos: Marco Neubert (above left), Anke Hahn (below left), Henriette John

# LAND REVITALISATION IN THE METROPOLITAN CITY OF TURIN: TOWARDS MORE LIVABLE PLACES

Growing land use pressure, unbalanced peri-urban development, landscape fragmentation, biodiversity loss and soil sealing are the main aspects where the Interreg Central Europe Project LUMAT concentrates its effort. The main project objective is to integrate and support mutual cooperation between core city areas and surrounding municipalities and to achieve sustainable land use through a sustainable environmental management. The project partners within seven so-called Functional Urban Areas (FUA) elaborated local-based strategies of integrated urban environmental management where land use and soil management are optimised and are in accordance with the concept of ecosystem services.




Screenshot of LUMAT's InViTo tool to raise spatial knowledge and guide a balanced spatial development | Source: LUMAT/Città Metropolitana di Torino

LUMAT project partner Metropolitan City of Turin pursued the establishment of a supra-local structure for environmental management in the FUA Chierese and Carmagnolese to the south east of Turin, which is also part of a MaGICLandscapes case study area. One of the main environmental problems there is the high amount of soil consumption due to urban sprawl such as the expansion of industrial-manufacturing zones and residential housing areas which has also led to a loss of biodiversity and ecological connectivity.

Together with the municipalities situated in the FUA strategies and actions were identified that guarantee a change in terms of environmentally sustainable socio-economic growth for the entire area. In this regard LUMAT provided local stakeholders with tools for inter-municipal data sharing, monitoring of planning and decision-making.
For instance InViTo is an interactive support tool which guides users in building their spatial knowledge and awareness by means of interaction with dynamic maps in order to allow stakeholders to be informed before decision making.

The LUMAT project firstly defined the architecture of a coordinated environmental management and secondly has set up an integrated spatial programme for the area Chierese and Carmagnolese. In Chieri a former industrial area has been converted to an agricultural park based on the Payments for Ecosystem Services (PES) approach: Farmers and landowners are offered incentives in exchange for sustainable land management in order to provide ecosystem services.

**WHAT IS AN AGRICULTURAL PARK?**
*Agricultural parks are designed for multiple uses that accommodate small farms, public areas, and natural habitats. They allow small farmers access to secure land and access to local markets; they provide fresh food, and are an educational, environmental, and aesthetic amenity for nearby communities. The urban edge agricultural park concept stems from the simple idea that the most critical place to create common ground between urban and rural interests is in the interface between the two, on available land at the urban edge.*

Agricultural Park South Milano
Photo: milanocittastato.it

# INTERVIEW: HOW BEST TO RETAIN THE WATER IN THE LANDSCAPE?

*We spoke to Miroslav Těšina who is an environmental expert and former employee of venkovský prostor o.p.s in Liberec (CZ). He is actively supporting projects and initiatives towards a sustainable development of his home region, the Tri-border area Czech Republic, Poland and Germany.*

Left: Miroslav Těšina; photo right: VÚKOZ

### *Why is there an increased need for water retention in the landscape?*

**Miroslav Těšina (MT):** It is necessary and the only way to mitigate climate extremes. For the last 80 years Central Europe is being sealed, concreted and canalised. The water can't drain away and quickly runs off via channels and rivers towards the sea. In times of drought water retention is an important landscape service. The water is retained on the fields, pastures, in the forests, cities and villages. Water can constitute a variety of ecosystems like small wetlands, pools and other spaces where it is stored as surface and groundwater for a longer time. Some of these solutions for mitigating climate extremes such as drought and flooding have already been successfully implemented in practice.

The last decades' urban and rural planning priciples often oversaw the canalisation and "under-grounding" of watercourses which led to a drying of the soils and the landscape. In the region of Liberec the water retention is far away from its capacity. At least 30% of potential surface should be reallocated as water retention areas to achieve a normal hydrological cycle there and in other European landscapes within 5 years.

### *What measures for water retention already exist in the Tri-border region of the Czech Republic, Poland and Germany?*

**MT:** The best medicine against drought is water. Water is the blood of the earth. A lack of water means life is threatened. Nature-based dams and canals are easy to implement and effective. Tiny springs and brooks are the locations where water retention starts.

In the region of Liberec there was a small brook which dried out every summer. The construction of a cascade of 1m$^3$ water pools has essentially improved the water balance of the brook and during dry periods the water and the life within the pools remained. It is one example how it could work also with the 1,000 other brooks and streams in the low mountain ranges around Liberec. Poland and Saxony have similar problems caused by climate change impacts like drought. It is time to find a common solution for the landscapes of the Tri-border region CZ-DE-PL.

### *What are the main aims of future transnational cooperation on drought mitigation?*

**MT:** Today we already know a variety of measures for mitigating against drought. The first projects implemented have existed for several years now. In the Jizera Mountains for ten years dams have preserved the marsh water. The water level is increasing, the water can't flow off and disperses onto a wider area.

The most important steps now are information and education about climate change impacts and adaptation in order to motivate people into action. Different media formats should be compiled for school education, both teachers and pupils, but also for authorities, mayors, scientists, associations and for the public in general. There is a need for a common centre for environmental education in the Tri-border area CZ-DE-PL where information is made available in Polish, Czech, German and English. In the surrounding landscapes of Jizera, Ještěd, Zittau and the Lusation mountains there are many examples of successful water rentention measures that demonstrate good practice and could be used in training and education.

*Interview: Anke Hahn*

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