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Inspire policy making by territorial evidence

GRETA - “GReen infrastructure: Enhancing biodiversity and ecosysTem services for territoriAl development”

Applied Research

Alba Iulia Municipality

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Table of contents

List of Maps

List of Tables

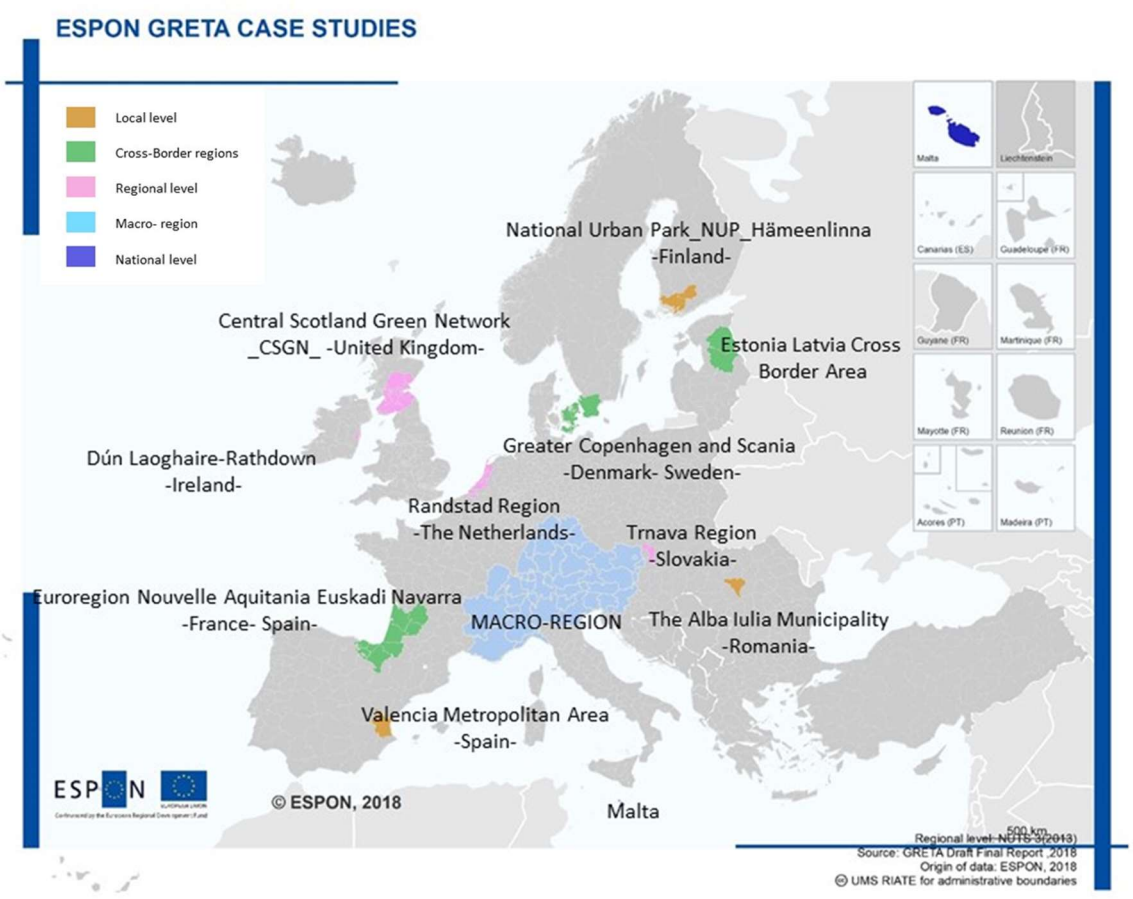
Abbreviations

EC	European Commission
ES	Ecosystem Services
ESPON	European Territorial Observatory Network
EU	European Union
GI	Green Infrastructure
LAU	Local Administrative Unit
NUTS	Nomenclature of Territorial Units for Statistics

1 Introduction

GRETA investigated 12 case studies that represented different spatial, institutional and governance settings and that ranged from urban centres to rural countryside. The case studies served to:

i. gain knowledge on implementation factors, drivers and constraints in different planning systems and territorial realities;
ii. gain insights on the use and applicability of economic methods in decision making; and
iii. gather knowledge for policy and practice as input and inspiration for the policy recommendations.



Map 1. ESPON GRETA selected case studies

Method

The activities undertaken at the case study level incorporated a combination of desk-based analysis alongside online questionnaires and pre-structured interviews to key actors in each of the case study areas, including: (i) decision and policy making representatives; and (ii) those involved in designing, planning, implementing and managing green infrastructure (GI).

A series of three consultations were developed to gather relevant information from case studies on different aspects of GI spatial analysis, policies, planning and implementation. The consultation process was seen as a combined approach of an online survey and or a telephone interview (which used the survey questions as the basis) with stakeholders to facilitate getting good engagement and to address any clarifications needed.

Consultation A – Economic Valuation

The questionnaire included 20 questions structured in 2 main parts. The first part aimed at understanding the current use and awareness of valuation methods by respondents while the second part aimed at identifying their perceived barriers and interest of using such methods. We used a mix of open-ended and closed-ended questions to combine comparable results as well as qualitative material; respondents also had the possibility to comment on their responses. Analysis of Consultation A is described in Annex III-C.

Access to Consultation A

https://survey.tecnalia.com/limesurvey/index.php/214247?lang=en

Consultation B – Characterising green infrastructure and ecosystem services characterisation

The objective of this consultation was to identify good practice guidelines, opportunities and challenges that could be useful for a variety of regions and cities. Responses to Consultation B were used to assess the usefulness of the GRETA methodology, a methodology specifically developed to delineate and map the main green infrastructure (GI) elements and their multifunctionality, as well as identifying their capacity to support three main policy domains: Biodiversity, Climate Change and Disaster Risk Reduction, and Water Management. Questions in Consultation B were designed to help us gain further insight into the enabling factors that exist in different regions and cities. We also sought to gather information on the challenges and barriers that may compromise the implementation of GI. The final set of questions focused on identifying the general benefits and potential synergies and trade-offs associated with GI projects.

The maps produced for Consultation B in the GRETA project were intended to provide a starting point for discussion about the applicability of the GRETA methodology from European to local application. As such they did not aim to be a substitute for the maps or other planning material that already exist at local case study level nor were they aiming to characterize the GI on regional or local level. They were not developed to be used as an output from case study levels.

The landscape elements in the maps are produced based on standardized European data sets with a minimum mapping unit of 25ha (i.e. CORINE Land Cover 2012) – smaller geographical features are not depicted. The Consultation B aimed at finding the gaps between datasets produced at the European level and any other data sets produced at regional and local scales.

Access to Consultation B

https://survey.tecnalia.com/limesurvey/index.php/614564?lang=en

Consultation C - Analysis of governance, policy and financial frameworks

The successful implementation of green infrastructure (GI) projects requires a combination of governance structures, integrated policies and financial support. This consultation therefore aimed to investigate the governance systems in place in each case study area in order to determine how policies and policy makers enable the implementation of GI projects in the case study areas.

Responses to Consultation C aimed to help us identify: (i) how much funding (money and personnel) is currently used for GI in the case study regions; (ii) if this funding is sufficient for implementing and maintaining GI; and (iii) the main sources of funding (public tax-based funds, private investments, NGOs or others). Consultation C also examined whether policies compliment or conflict with GI and assesses policy makers' knowledge needs for making full use of GI development potential.

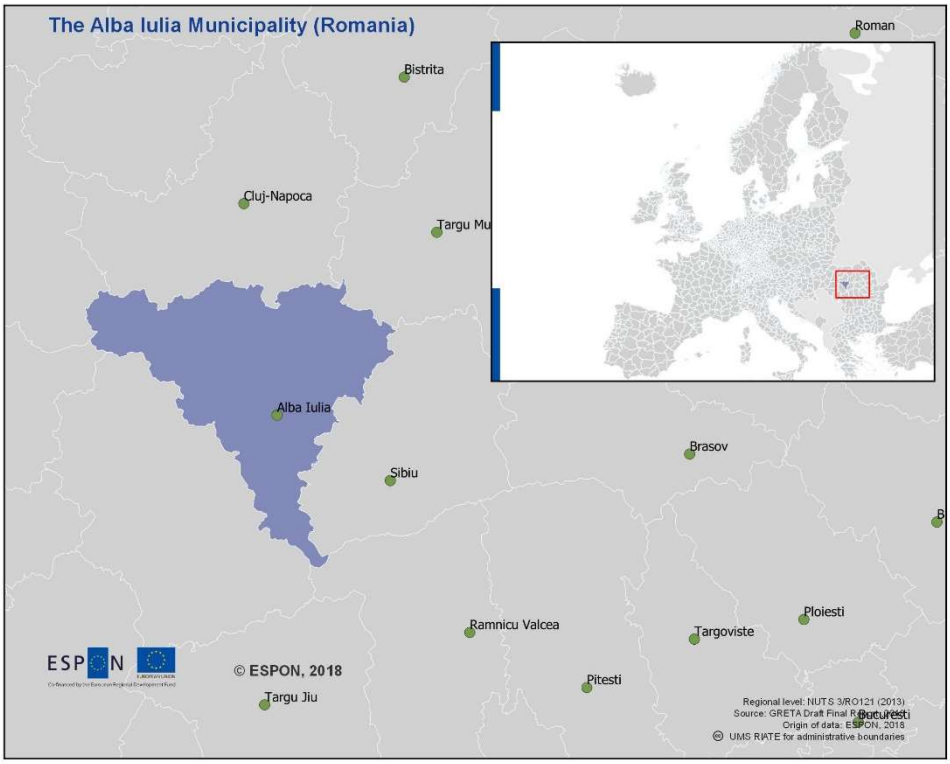
Access to Consultation C

https://survey.tecnalia.com/limesurvey/index.php/129674?lang=en

The content in this report is based on a mixed-method approach. The results presented are interpretations of semi-structured interviews, responses to a questionnaire on national policy and planning, responses to three consultations (Consultation A, B and C) via email, document analysis of plans and strategies (via desk-based analysis), and statistics.and spatial analysis using GIS resulting from the GRETA project. For all case studies, telephone conversations (and for some cases face-to-face meetings i.e. Copenhagen and Scania, Alpine region, Euroregion Aquitania- Euskadi-Navarra) allowed the completion of the consultations B and C.

The respondents who have contributed to this case study are people working in the public administration in Alba Iulia Municipality.

2 (Geographic) description of the Alba Iulia Municipality



Map 2. Alba Iulia Municipality

2.1 Case study outline

Alba Iulia with a population of 74.283 inhabitants in 2017, and 103,6 km^2 is a medium size city, capital of Alba County, in Transilvania, Romania. The population is increasing over the last 15 years, while the national trend is population decrease.

Alba Iulia is an important historic city for Romanians, Hungarians and Transylvanian Saxons. The municipality encompassess four villages: Bărăbanț, Micești Oarda and Pâclișa. It has a relatively low population density of 718 inhabitants/km^2.

Region/Area (French: Nomenclature des unités territoriales statistiques (NUTS) Classification of Territorial Units for Statistics).	NUTS3- RO121 LAU code 1017 https://albaiulia-city.map2web.eu
Geographical features **Case study Area in km^2** **Bioclimatic region**	Total area Alba: 6241,6 km2 Total area Alba Iulia: 103,6 km2 (city) Continental humic bioclmate

Economy and productive activities are charactized by new actors and new activities that replace the old factories (fire bricks, footwear and carpets) which were symbols of the Communist regime:

- 50 years tradition in fine ceramics (and IKEA global provider)
- food industry (nationally dominant in their market segment)
- wood processing (Alba County–one of the most important wood providers in Romania)
- automotive industry (car parts production)

Social composition:

- 47% of the total population is economically active (but above the national average of 45,6%)
- 21,7% retired persons
- Relatively low unemployment rate: 5% (also due to persons working abroad)

Environment:

- 20m^2 of green space/ inhabitant (2020 target: 26m^2/ inhabitant)
- aim at 24% reduction of CO2 emission by 2020, compared to 2008
- solar energy and biomass, potential reliable sources for renewable energy: an important number of public institutions (schools, city hall departments, technical colleges, center for the elderly) have had installed solar panels which cover their electricity needs in a sustainable way; also part of the social housing in the city cover their energy needs from renewable sources.

2.2 Territorial challenges

Alba Iulia has been pioneer and pro-active city in terms of integrated urban development, where the main territorial challenges are:

- Management of socially and economically deprived urban areas
- Regeneration of degraded spaces in former industrial areas
- Improvement of mobility needs and in cases of obsolete infrastructures
- Other socio-economic challenges:
    - micro-regional economic disparities (Alba Iulia vs its peri-urban area)
    - insufficient correlation between local and regional strategies -
    - high rate of demographic dependence
    - defining a more precise economic profile
    - switching a production-based economic model to a new one, based on innovation
    - smart specialization in sectors with a high added value

Between the year 2007 and 2013, the municipality implemented a Plan for Integrated Urban Development, which has delivered important outputs and results. The municipality rehabilited the largest citadel in Romania (18th century Vauban fortification) with the aid of EU funding attracted in the historic area of up to over 50 million Euros, and over 200 million Euros attracted

overall for city development in the 2007-2018 period. Alba Iulia is now an emergent tourist destination at national and European level.

In terms of environmental outcomes:

- 100% access to running potable water
- 87% of households connected to the sanitation system and 1 new water treatment installation

In terms of sustainable energy:

- 1700 solar panels installed in 4 public buildings
- A modernizing public lighting system (the municipality submitted in 2018 a nr of 3 projects under the Regional Operational Program for the modernization of public lightning at the whole city level)

Regarding urban regeneration and public services quality:

- 55.000 m^2 of walking areas and public squares
- 20.000 m^2 of new parking places
- 15 km of new bicycle lanes
- 4.7 km of walking paths
- 179 pieces of urban furniture
- 3410,51 m^2 of pavements,public squares and green areas
- 1 recreation area of 22ha –arboretum and adventure park
- 1 modernized elderly care centre

Alba Iulia is today considered a city for the people where tourism and culture are the long-term development triggers. In this context the municipality has developed an Integrated Strategy for Urban Development for the period 2014-2023, towards a a more attractive place for living, working, investing and visiting. It has a double aim i) making Alba Iulia a green, smart, cohesive, inclusive and competitive city. Ii) getting the tourism-based development of the city to the next level by building on 2007-2013 results.

The strategy has five action themes:

- Sustainable, intelligent and competitive economic growth
- Inclusive social development
- **Climate change adaptation**
- Encouraging and maintaining demographic balance
- **A sustainable, clean and green urban environment**

3 The GI network and its potentialities for territorial development in Alba Iulia Municipality

3.1 What is the approach to GI and Ecosystem Services

Alba Iulia municipality has adopted the GI as an intrinsic part of spatial planning and the City General Urban Plan. Although Ecosystem Services (ES) are not formally recognized, as such, in the GI approach at the local level, it seems that there are implicitly assessed , as it has been the case for biodiversity protection, recreation, culture and wellbeing.

The main threats for GI development and maintenance are: Infrastructures (i.e transport, energy), territorial planning, financial limitations and climate change. On the other hand, the main opportunities are the economic investment, territorial planning (also seen as a threat), local community and the sustainable forest management

Main services provided by your current and/or planned Green Infrastructure. Please select multiple options	Main current and/or anticipated threats for both Green Infrastructure development and maintenance. Please select multiple options if needed.	Main current and/or anticipated opportunities for Green Infrastructure development. Please select multiple options if needed.
■ Biodiversity protection ☐ Maintenance of ecosystem services ■ Cultural ■ Economical ■ Wellbeing and health ■ Others: Education, Science	■ Infrastructures (i.e transport, energy) ■Economic development ■Territorial planning ☐ Absence of community ■ Financial limitations ■ Others: Climate change	■ Economic investment ■ Territorial planning ■ Local community ■ Sustainable forest management ■ Others:further development of biodiversity protection

GI its being enhanced (or driven by) by sector policies and plans, in particular, the Sustainable Urban Mobility, Sustainable Energy Action Plan within a Smart Cities approach, and also by tourism.

In terms of governance the vertical cooperation has been very successful. The municipality has cooperated with the regional authorities for the co-funding and co- management of the local GI.

The Mamut Transalpina "bicycle track

As an example, the" Mamut Transalpina " project was approved in 2011, when the City Hall of Alba Iulia signed the financing contract with the Center for Regional Development Agency for "Valorisation of natural tourism resources in the Mamut area.

Just a few kilometers from the center of Alba Iulia, on Mamut Hill, there is a bicycle track that measures just over 5 kilometers and connects through the woods two of the city's districts: Miceşti and Pâclişa. This track has a width of 3 meters and is accompanied by a 2-meter wide pedestrian walkway, which the promenades eager to walk around and admire the view.

In addition to the pedestrian area and the bicycle track, there is also a paved roadway for car traffic, but only for a part of the route (about one kilometer).

Along the entire route there is also a recreation area equipped with a central restaurant pavilion, two grill places, tables, 12 arbors and a parking lot where visitors can leave their cars. There are also specially arranged places where visitors can leave their bikes.

The difficulty of the runway is one of medium level: climb to about 2 kilometers and 3.5 kilometers downhill.

Called by the cyclists "The Mamut Transalpina ", due to the climbing and descent sections and the "altitude" sensation in the area, the bike track is properly signposted and has 100 meters away, relax benches and trash cans.

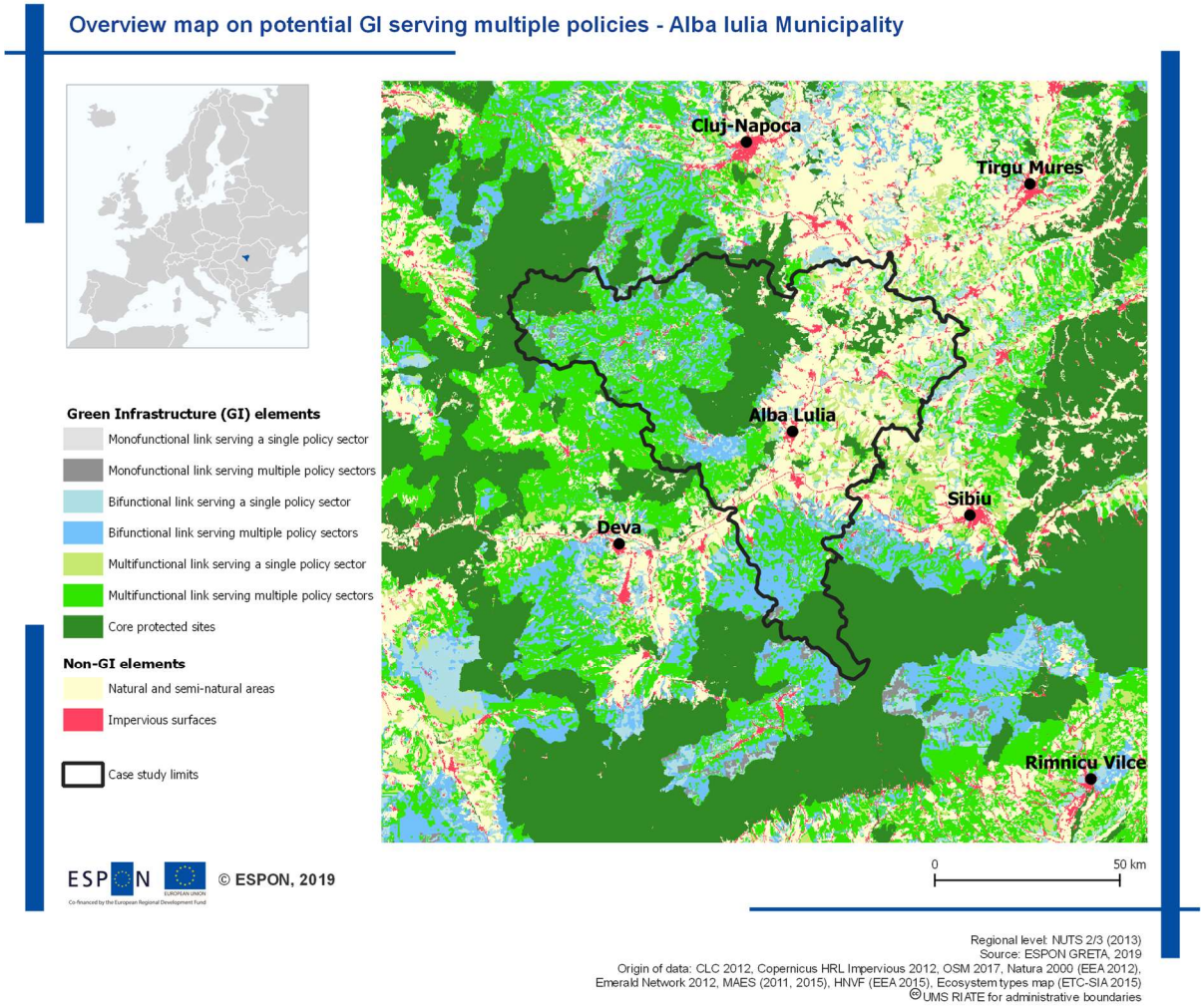
The Arboretum

Another example is represented by The Arboretum a unique park in Romania by its arrangement, in the middle of a city forest, on the Mamut Hill. Was founded in the year 2001, covering 21 hectares.

The park has more than 1200 species of birds and insectivorous bird which have been multiplied, so the chemical treatments were completely eliminated.Also in the park you will discover, on a winding trail, an alley 140 meters long. Practically, the place of the earth was taken by cones, quartz, hay, straw, sand, wooden rods, bamboo sticks, river stones, oak leaves, hornbeam seeds. It is the place where you can stroll barefoot as a free therapeutic massage. Inside the park there is a museum that hosts wood collections. You have the opportunity to see coniferous cones from Alpine Europe, black and gray walnuts from North America, Chinese spruce, etc. For every species the scientific name, the popular name and the country of origin are indicated.

3.2 Benefits of GI and ecosystem services for smart, sustainable and inclusive territorial development

This section describes the potential GI network as delineated by the GRETA project in the Alba Region, analyses the identied synergies and trade-offs between the ES provided by the GI network and its potential for serving several policy objectives, and provides a relative analysis of the region with the general EU patterns.



Map 3. Alba Iulia Municipality GRETA case study. Overview map on potential GI serving multiple policies.

At the level of the Alba County, potential GI network covers more than half of the Alba County region (NUTS3 level). However, there is an uneven distribution, being the Mureș river plain the area with less potential GI due to extent of intensive agriculture.

- Special attention should therefore be placed to Mures river plain where conflicts may arise because the mixed uses (agricultural, transport infrastructures, residential and industrial areas). It should be ensured that the existing potential for GI is consolidated to avoid further fragmentation and to keep the balance with the above-mentioned mixed uses.

The region shows a high level of connection of hubs (protected areas). Protected areas represent medium to low share of the total GI.

- There is a clear West-East divide. While in the Western part, potential GI is well structured, in the sense that it ensures connectivity of protected areas, the connectivity on the Eastern part is weaker threatened by the agricultural activity and different

infrastructures. Therefore, connectors on the Mureș river plain need to be consolidated to ensure a coherent GI network.

Regarding the GI potetial to support to policies related to Biodiversity, Climate Change and Disaster Risk Reduction, and Water Management, the potential GI, and related ecosystem services, are able to support biodiversity and climate change policies. There is less capacity to support water policies.

- In terms of multifunctionality, all the area is capable to support at least two of the three policy objectives. It is of special concern the limited capacity to support water policies related to flood prevention, erosion control and limitation of soil erosion.

Most of the ES have a neutral relationship, i.e. there is no interaction or no influence between ES.

- There are no spatial issues related to synergies or trade-offs. It is not expected that improving certain conditions would have no side effects on other ES.

At the city level, about 80% of Alba Iulia is covered by green urban areas, which positions this city in the upper range in Europe. Moreover, there is also a good coverage of GI in the peri-urban area although it is unevenly distributed. Urban green areas slightly decreased between 2006 and 2012.

- There is already a good connection of the GI inside the city and in the peri-urban areas. However, the pressure from agriculture and built-up areas requires specific attention on the GI in order to avoid further fragmentation. Also in the peri-urban area, we found some GI with lower multifunctionality.

It could be concluded that the region has good conditions for the implementation of a multifunctional GI network at landscape level; there is a large cluster of hubs (protected areas) well connected with the potential to provide several ES. However, the Mureș plain is the area with higher complexity given the intensity of uses (e.g. agriculture). Therefore, good planning is required to ensure the GI in this specific area, which will also facilitate the connectivity of protected areas. Regional and local knowledge should be used to better understand the limitations of the GI to support water policies.

4 Capacity of GI network in Alba Iulia Municipality to meet the demand of ES

According to stakeholders consulted, cost-benefit analyses and methods have been used in the decision-making process when deciding about best ways to manage or invest in GI in the municipality, particularly as ex-ante evaluation, although, as it has been already pointed out, ecosystem services as such are not explicitly assessed. The information included in the analysis to describe the benefits generated by the GI are: ecological and socio-economic information in non-monetary terms. The analyses that have been undertaken are linked with recreation, climate change (mitigation and adaptation) and health.

4.1 What do GRETA analysis on ES supply and demand reveal?

GRETA have explored the capacity of GI network to meet the demand of ES where:

ES supply is defined as the capacity of ecosystems to provide ES, irrespective of them being used.

ES demand can be defined as the amount of a service required or desired by society in a given location and time. This demand depends on several factors such as socio-economic conditions, cultural/behavioural norms, technological innovations, availability of alternatives, among others.

	ES Supply – benefits provided	ES Demand -specific definitions	Approaches to quantify Demand
Regulating services	Benefits are provided by maintaining desirable environmental conditions	Amount of regulation needed to meet target conditions	Reduction of risk
Cultural services	Benefits are provided by experiencing the natural environment	Desired total use (if rival service) or individual use (if nonrival service)	Preference and values // direct use
Provisioning services	Benefits are derived from consumption of final goods	Amount of goods obtained per unit of space and time or per capita	Direct use // Consumption

Table 1 Relation between benefits provided by ES supply and the corresponding ES demand definitions and operationalisation approaches. Adapted from: Villamagna et al., 2013 and Wolff et al., 2015.

Demand for **regulating services** can be defined as the amount of those environmental conditions that ensure the provision of a desired regulation level. A reduction of risk approach has been usually applied to quantify demands for these services. Vulnerability to potential changes in regulating services may provide valuable insight into society's needs capturing main linkages from the socio-ecological system.

Demand for **cultural services** has been mostly assessed by preferences and values for attributes of certain landscapes, ecosystems or heritage sites. Preferences may be either quantified through stated preferences that relate to the desired level of services, or through revealed preferences (a proxy for the actual use of the service). Demand for cultural services has also been assessed by the direct use of a specific ecosystem, e.g. for recreation. This can be quantified by total visitor days per year or the number of fishing/hunting licenses, the presence of tourists or accounting the accessibility or proximity to recreational areas.

Demand for **provisioning services** has been quantified based on direct use and consumption of final. It is worthy to note that there is normally a spatial mismatch between the area where the service is provided and the area where the service is consumed, especially true for provisioning services. For this reason, interregional linkages have to be considered in order to properly identify faraway dependencies and assess magnitude of potential impacts

Following the proposed conceptual framework, we have combined demand and supply for each of the selected ES. The focus of this approach was to highlight those areas where there is a high demand and a low supply, i.e. those areas where GI is unable to cover the ES demand. It should be noted that these results are of a more exploratory nature in the whole GRETA project considering the following limitations:

- This is a research area still under development;
- There is need for a higher resolution of the data sources given the nature of the phenomena analysed;
- Balance between supply and demand is semiquantitative; and
- In some cases, a more sophisticated modelling would be required to have an appropriate quantitative balance.

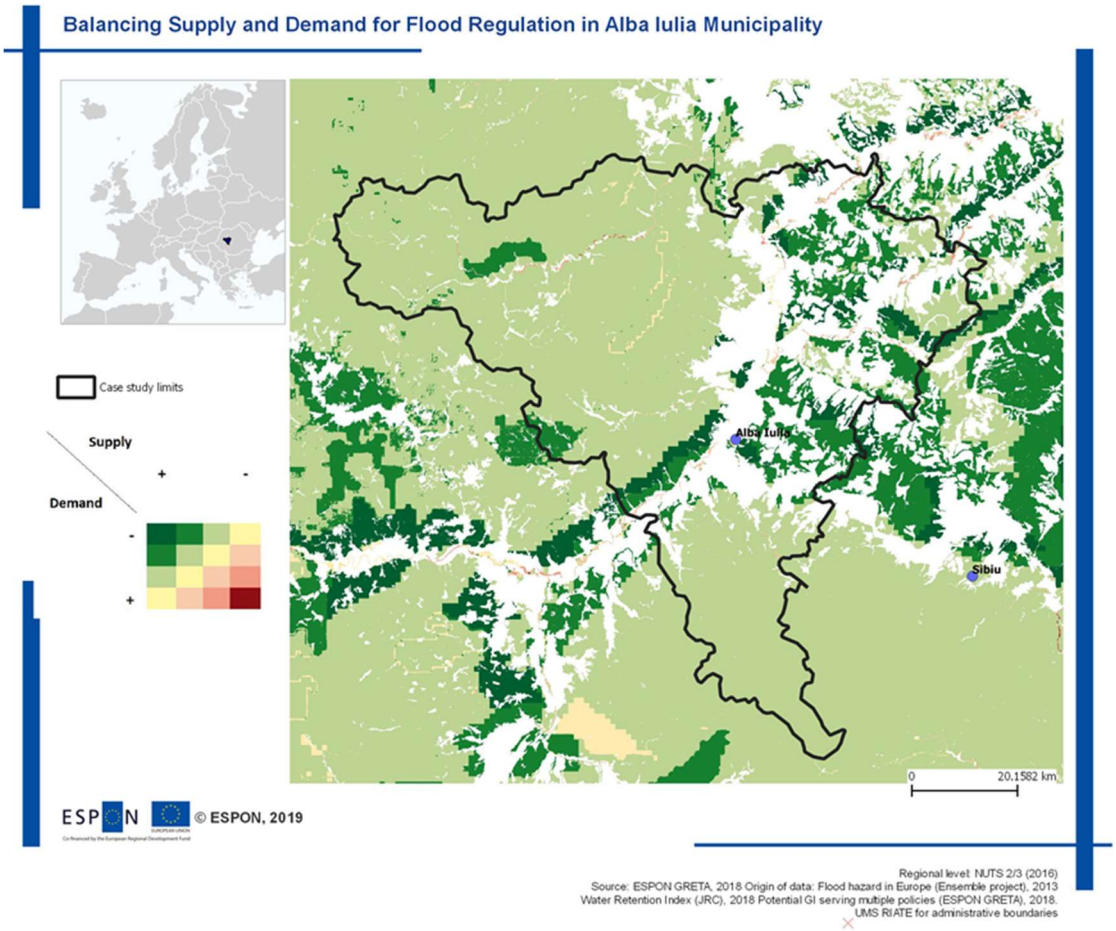
Therefore, these results should be seen as illustration on how this demand and balance could be approached.

4.1.1 Analysis of supply and demand for Flood Regulation in Alba Iulia

We have quantified demand for flood regulation based on the potential flood hazard. Exposure is described by the projected potential flooding risk[1]. On the other hand, benefits are provided by the water storage capacity of land to regulate floods. The supply for flood regulation is quantified by the Water Retention Index, which assesses the capacity of landscape to retain and regulate water passing through. This index is dimensionless and considers the role of interception by vegetation, the water-holding capacity of the soil, and the relative capacity of both the soil and the bedrock to allow percolation of water. The influence of soil sealing and slope gradient are additionally considered.

Map 4 presents a semi-quantitative analysis of the balance between supply and demand for flood reguation in Alba Iulia Municipality. Dark green areas are those with maximum capacity of supply and demand is very low. These conditions are met in core protected areas and very relevant in the north-east part of the municipality where natural and semi-natural areas (i.e. agricultural land) are more prominent. The other parts of the municipality that are still green could be considered areas where the balance tend to be positive, in the sense that the supply is slightly higher than the demand. In practical terms it would mean that improving or reinforcing GI with the objective of water retention will have a relative benefit.

[1] for the period 2011-2044 that results after applying the LISFLOOD model from the ENSEMBLES project



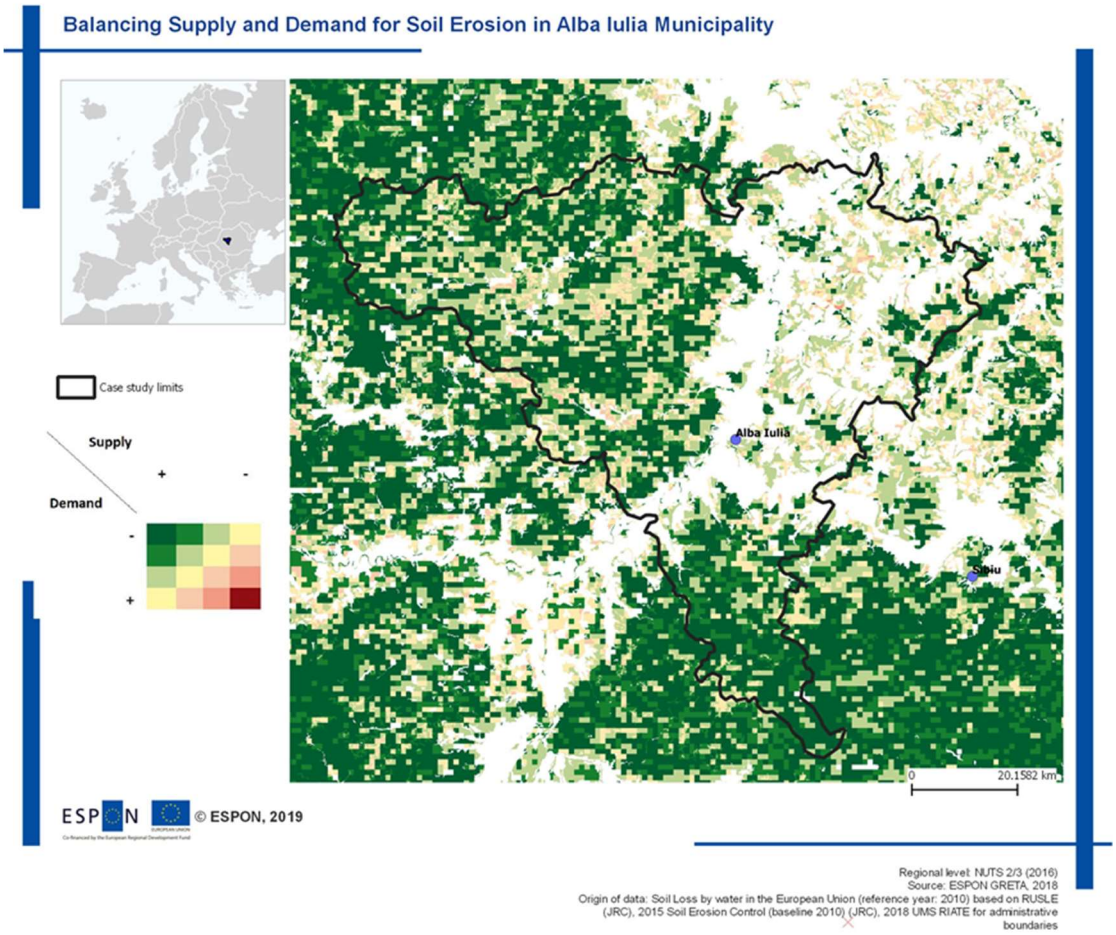
Map 4 Balancing Supply and Demand for Flood Regulation in Alba Iulia Municipality.

4.1.2 Analysis of supply and demand for Reducing Soil Erosion in Alba Iulia

We have assessed the demand for the reduction of soil erosion by water producing a negative impact on several ES; in particular to the ones related to crop production, drinking water and carbon stocks. Soil erosion by water is mainly affected by precipitation, soil type, topography, land use and land management. Exposure is described by the soil loss rate[2] (t ha^{-1} yr^{-1}). Benefits are provided by the capacity of vegetation to control or reduce erosion rates. The supply is quantified by the Soil Erosion Control dataset (JRC) that describes the capacity of ecosystems to avoid soil erosion.

From the resulting Map 5, we can observe a clear geographic west-east pattern, with the east area being the one where efforts for soil erosion control will be more effective.

[2] as estimated by the modified version of the Revised Universal Soil Loss Equation (RUSLE) model



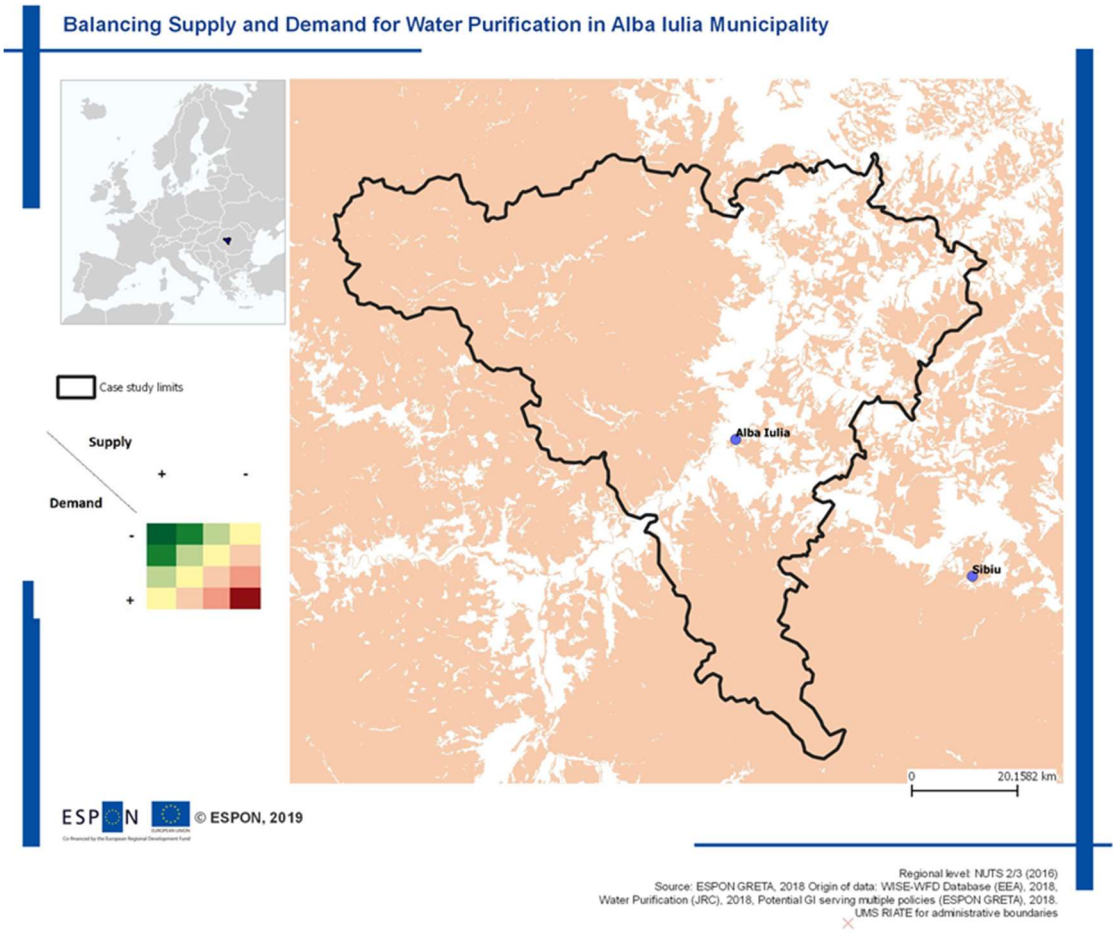
Map 5. Balancing Supply and Demand for Soil Erosion in Alba Iulia Municipality

4.1.3 Analysis of supply and demand for Water Purification in Alba Iulia

We have quantified demand for water purification based on the level of pollutants emitted to freshwater ecosystems by polluting sectors, primarily agriculture and waste water treatment discharges from industry and households. Exposure is described by mean annual concentration of nitrates in water [3](. The supply is quantified by the Water Purification dataset (JRC) that assesses the in-stream retention efficiency of ecosystems to dilute or degrade nutrients.

Resulting Map 6 shows that water pollution is still a big challenge and substantial increase on the provision of water purification is still required under current status in most of the municipality

[3] tonne per year) captured in monitoring stations and aggregated by rivers (the WISE-WFD database)

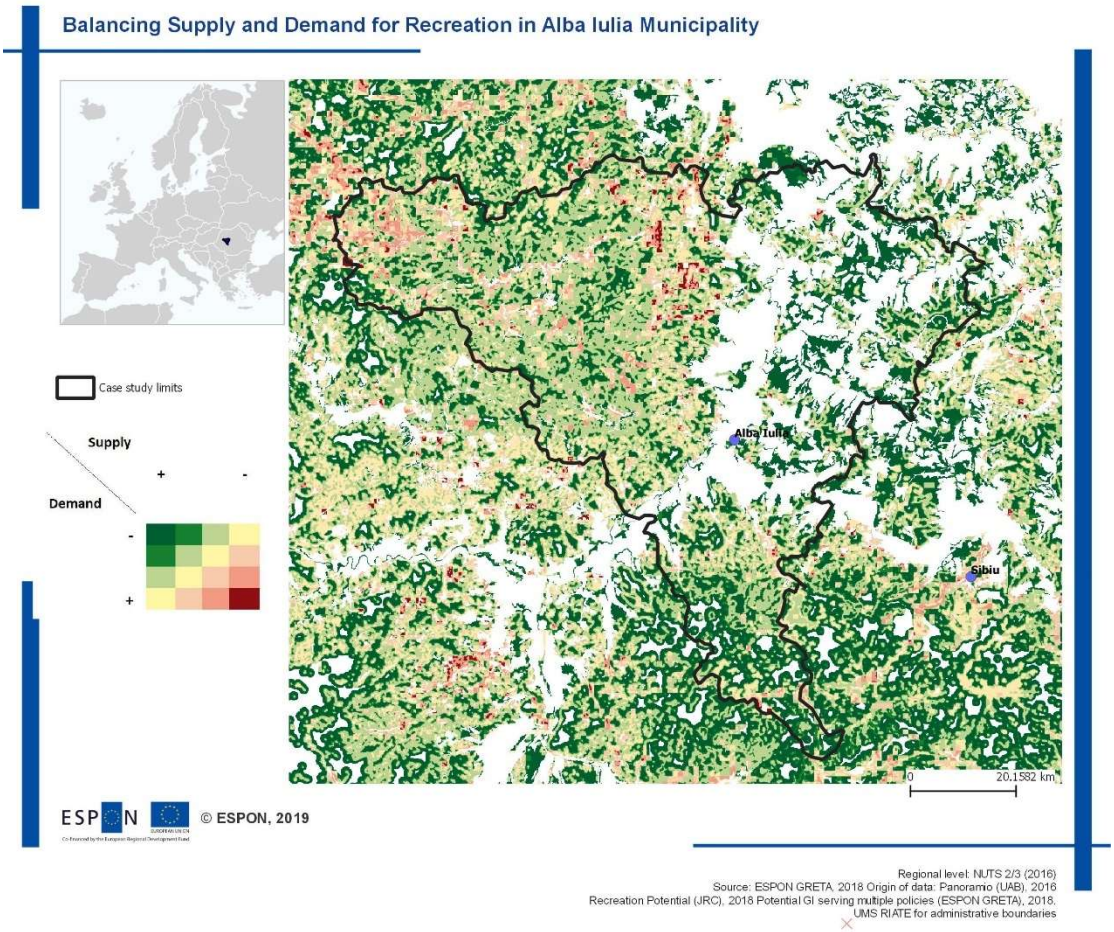


Map 6. Balancing Supply and Demand for Water Purification in Alba Iulia Municipality

4.1.4 Analysis of supply and demand for Recreation in Alba Iulia

We have described demand for recreation by means of a proxy for visitation. Recreation and tourism are important elements for national and local economies, that also contribute to other intangible benefits. Recreation directly depends on environmental attributes like species richness, diversity of habitats, and climate. The usability of crowd-sourced information by means of location photographs has already been shown to be as a reliable proxy for visitation rates to recreational sites. We have used the location of photographs in Panoramio as a proxy for landscape attractiveness for visitors. Demand is quantified by the number of pictures per square km. On the other hand, supply is described by the Recreation Potential dataset (JRC) that quantifies the potential for citizens for outdoor recreation.

The resulting Map 7 does not show a clear pattern but a diversed mixed of areas where supply meet the demand together with areas in need for reinforcing supply that could be partly explained as direct link with population density.



Map 7. Balancing Supply and Demand for Recreation in Alba Iuila Municipality

5 Governance practices, policy and planning instruments to implement GI and enhance ecosystem services in Alba Iulia Municipality

Romania has not developed an integrated national green infrastructure (GI) strategy, which is a core recommendation of the European Green Infrastructure Strategy. An integrated strategy appears to be needed as unsustainable economic development has caused excessive resource exploitation and habitat fragmentation throughout the country (EC, 2015). However, Romania has supported the implementation of the European Bird and Habitat directive through the Natura 2000 network, which covers over 20 percent of its territory.

Based on the two survey results, it is unclear what types of strategic policy development are currently taking place to support GI policy development at the national or regional levels. While there is no national GI strategy, key policy frameworks are understood as the support frameworks for GI implementation. This includes: The National Strategy on Climate Change and Low Carbon Development (2016-2020), the Master Plan for Transport in Romania 2030, the Territorial Development Strategy of Romania 2035 and the National Rural Development

programme. Further, financial support from the EEA is being applied to support the Mapping and Assessment of Ecosystems and their Services (MAES).

In line with MAES implementation, European funds are considered an important mechanism to support GI implementation in the country. This includes the ERDF - the European Regional Development Fund, which was considered very important by both survey respondents. The Cohesion Fund was considered important by both respondents. According to the European Commission's GI policy overview (EC, 2015), these funds have been important in implementing spatial connectivity and restoration as natural ecosystems, particularly in terms of creating demonstration sites to promote raised awareness among the public.

The EAFRD - the European Agricultural Fund for Rural Development; and LIFE+ and Horizon2020 project funds were considered very important, important or somewhat important by the two respondents. Responses concerning the ESF - European Social Fund, The EMFF - the European Maritime and Fisheries Fund; and the NCFF - the Natural Capital Financing Fund were inconclusive concerning their role in promoting GI development.

Based on the survey undertaken in GRETA for elaborating the NFS for Romania, seems that there are differing opinions concerning the roles of different governance actors for developing GI policy and implementing GI in practice.The national government, and its associated policies, seems to have a core role in supporting GI with strong role of the municipal scale in terms of GI policy development and implementation.[4]

For financing, besides the above-mentioned EU-funds, funding is also available through the European Environment Agency for MAES implementation and, together with Norwegian Grants, to support the implementation of Green Infrastructure through four priority domains: biodiversity and ecosystem services, pollution reduction, energy efficiency, renewable energy and adaptation to climate change (EC, 2015).

On a national level, it appears that some GI information platforms have been developed. Information about the location of protected areas is viewed as always available through digital maps on the Ministry of Environment's website (2018a). Further, information about environmental quality of these areas in terms of biodiversity rates, ecosystem services and/or other quality measures is also often available through the websites of protected areas, and on Ministry's website (2018b). This information is stated to be often used in regional and local spatial planning, especially when developing management plans for protected areas. Green space factor was also mentioned by one respondent as an example of planning instruments that have been implemented to support elements of GI.

[4] National Fact Sheet Romania Scientific Annex IV-B chapter 26.

What characterizes an effective governance model and practice in Alba Iulia municipality: lessons learned from previous experiences in integrated sustainable urban development

The Mamut Transalpina project was approved in 2011, when the City Hall of Alba Iulia signed the financing contract with the Center for Regional Development Agency for "Valorisation of natural tourism resources in the Mamut area. Dendrologic Park "Dr. Ioan Vlad "- Valea Popii from Alba Iulia.

The total value of this project was about 11 million lei, of which 5 million lei come from European funding accessed by Alba Iulia City Hall and the rest of the total amount was provided from the local administration budget.

Multidisciplinar approach is being used in the municipality as principle for good governance particularly in the context of integrated sustainable urban development and this princicple would perfectly appliy fro the implementation of GI, with the involvement of regional and public bodies, academia, cultural instuitution, private sector (land owners, providers of public utilities), civil society, economic agents (i.e. real state agents.

Public and stakeholders consultation to find out the needs and objectives, cooperation for the delivery of specific projects: i.e. pilots, actions and political stability and support are identify as the main elements for successful GI implementation process.

Current policies and or strategic plans related to Green Infrastructures and Ecosystem Services developed for the area.

Formal: Covenant of Mayors,The City General Urban Plan,The Sustainable Energy Action Plan,The Sustainable Urban Mobility Plan

What are the main drivers and enablers and priorities for implementing green infrastructure in Alba Iulia municipality?

The main drivers are the need to achieve a sustainable development for the city through reducing the carbon footprint and relying more on renewable energy sources. This priority has been set not only through strategic documents such as the Integrated Strategy for Urban Development, the Urban Mobility Plan or the Smart City Strategy elaborated by the Company Siemens (the Crystal Department in London), but also through surveys realized in 2014 and 2015 conducted at local level through which it was revealed the desire of city's inhabitants to live in a greener city. Last but not the least, the municipality is also very committed to the international and European principles to which it abides in the area of greening by being a signatory of the Convent of Mayors and other similar strategies/documents.

What funding and/or financing mechanisms have been used to implement and manage green infrastructure?

The Regional Operational Program has been a reliable instrument but also other funding received from the central Government (Romanian government programmes) also local budget. Public-private partnerships were also employed and in some regard the private funding can also be considered relevant due to projects which were implemented in this area through private funding (Smart City project and the solutions installed and tested so far (https://albaiuliasmartcity.ro/), IVelo bike station with over 60 bikes installed in the city, Gradinescu project (public gardening in the heart of the city), etc).

Other tools and budgets for implementing GI in Alba Iulia are the ERDF - the European Regional Development Fund, the CF - the Cohesion Fund, the EAFRD - the European Agricultural Fund for Rural Development and the LIFE and Horizon2020 programs, along with URBACT and Interreg programmes being also very important for Alba Iulia municipality.

6 Lessons learned and good practice examples from the Alba Iulia Municipality

GI delineation and ES analysis

Although the delineation of the GI network potential provided by the GRETA project might not have the most suitable scale to allow decision making at the local level, the methodology and approach applied to idenfity the provision of ES and contribuytion to policy objectives is considered valuable and transferible.

The municipality has adopted GI as an intrinsic part of spatial planning and the City General Urban Plan. Although ES are not formally recognized as such in the GI approach at the local level, it seems that some ES are implicitly assessed: i.e. recreation

Relevance of the sector policies as boosters for GI implementation

GI its being enhanced (or driven by) Sustainable Urban Mobility, Sustainable Energy Action Plan within a Smart Cities approach, and also by tourism.

Cost-Benefit Analyses have been used in the decision-making process when deciding about best ways to manage or invest in GI- particularly as ex-ante evaluation. The analyses have been undertaken for: recreation, climate change (mitigation and adaptation) and health. The information included in the analysis to describe the benefits generated by the GI are: ecological and socio-economic information in non-monetary terms.

Good Governance horizontal and vertical is crucial for successful GI implementation at the local level.

In terms of governance the vertical cooperation has been very successful. The municipality has cooperated with the regional authorities for the co-funding and co- management of the local GI.

As an example, the” Mamut Transalpina " project was approved in 2011, when the City Hall of Alba Iulia signed the financing contract with the Center for Regional Development Agency for "Valorisation of natural tourism resources in the Mamut area.

Political willing and commitment could make a huge difference

Alba Iulia does offer good practices in the field of city-branding as a small/ médium sized city (‘Good Practice Model’ award-URBACT Secretariat competition) and also innovative practices as the Smart City pilot project 2018[5], which aims at investing in 100 pilot intelligent solutions for all areas of public life- this becomes also an opportunicy for the enhancement of GI and Nature-based Solutions.

[5] https://albaiuliasmartcity.ro

7 Policy messages and recomendations in Alba Iulia Municipality

Specific trends in terms of resources that depend up on the type of G implemented

At the city level, both local budget and European funding were employed for the implementation of green infrastructure along with public-private partnerships. It is important to mention that the cost-effectiveness of restoration areas is to a large degree dependent on long-term estimates of pay-back, which tend to be difficult to predict. Restoration zones have proven potentially cost-effective, particularly where coupled with direct use and cultural values, and have demonstrated success in delivering conservation and sustainable development objectives. Green urban projects implemented have been widely found to have high cost-benefit ratios, despite high initial implementation costs.

Factors that enable or hinder GI implementation

Factors that enable: Strategies at local, regional and national level, European funding oportunities (ROP thrrough the ERDF), new technologies available for adoption by local authorities in the GI area, the desire of citizens and tourists for more green space in the city, the presence of natural capital and GI at city level such as the Mamut Forest on the Western side of the city, and the presence of the Ampoi and Mures rivers on the Eastern side of the city which bring many opportunities.

Factors that hinder: Bureaucracy, rigid legislation in the GI area, lack of funding (if EU funds are not accessed through projects), car-oriented mentality of citizens and dramatic increase in the number of cars used (thus the need for more parking spaces instead of green spaces), rapid urban development, etc

Policies that are challenging or counter-productive for implementing green infrastructure

The policies for reducing CO^2 and implementing green infrastructure at local level are not challenging but their implementation bring numerous challenges for the local authorities due to the numerous factors to be considered. In some cases the lack of policies is more problematic for example the lack of policies for reducing car-based transport and increasing public transport hinders the development of GI infrastructure. Another example would be the lack of a policy/strategy for approaching natural green infrastructure such as the Mamut Forest or the Mures and Ampoi Rivers which could bring many benefits to the city's development.

ESPON 2020 – More information

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