

TeMA

Journal of
Land Use, Mobility and Environment

This special issue collects a selection of peer-review papers presented at the 8th International Conference INPUT 2014 titled "Smart City: planning for energy, transportation and sustainability of urban systems", held on 4-6 June in Naples, Italy. The issue includes recent developments on the theme of relationship between innovation and city management and planning.

Tema is the Journal of Land use, Mobility and Environment and offers papers with a unified approach to planning and mobility. TeMA Journal has also received the Sparc Europe Seal of Open Access Journals released by Scholarly Publishing and Academic Resources Coalition (SPARC Europe) and the Directory of Open Access Journals (DOAJ).

INPUT 2014

papers selected

Smart City

planning for energy, transportation
and sustainability of the urban system

SMART CITY

PLANNING FOR ENERGY, TRANSPORTATION AND SUSTAINABILITY OF THE URBAN SYSTEM

Special Issue, June 2014

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TeMA. Journal of Land Use, Mobility and Environment offers researches, applications and contributions with a unified approach to planning and mobility and publishes original inter-disciplinary papers on the interaction of transport, land use and environment. Domains include engineering, planning, modeling, behavior, economics, geography, regional science, sociology, architecture and design, network science, and complex systems.

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This special issue of TeMA collects the papers presented at the 8th International Conference INPUT 2014 which will take place in Naples from 4th to 6th June. The Conference focuses on one of the central topics within the urban studies debate and combines, in a new perspective, researches concerning the relationship between innovation and management of city changing.



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EIGHTH INTERNATIONAL CONFERENCE INPUT 2014

SMART CITY. PLANNING FOR ENERGY, TRANSPORTATION AND SUSTAINABILITY OF THE URBAN SYSTEM

This special issue of TeMA collects the papers presented at the Eighth International Conference INPUT, 2014, titled "Smart City. Planning for energy, transportation and sustainability of the urban system" that takes place in Naples from 4 to 6 of June 2014.

INPUT (Innovation in Urban Planning and Territorial) consists of an informal group/network of academic researchers Italians and foreigners working in several areas related to urban and territorial planning. Starting from the first conference, held in Venice in 1999, INPUT has represented an opportunity to reflect on the use of Information and Communication Technologies (ICTs) as key planning support tools. The theme of the eighth conference focuses on one of the most topical debate of urban studies that combines , in a new perspective, researches concerning the relationship between innovation (technological, methodological, of process etc..) and the management of the changes of the city. The Smart City is also currently the most investigated subject by TeMA that with this number is intended to provide a broad overview of the research activities currently in place in Italy and a number of European countries. Naples, with its tradition of studies in this particular research field, represents the best place to review progress on what is being done and try to identify some structural elements of a planning approach.

Furthermore the conference has represented the ideal space of mind comparison and ideas exchanging about a number of topics like: planning support systems, models to geo-design, qualitative cognitive models and formal ontologies, smart mobility and urban transport, Visualization and spatial perception in urban planning innovative processes for urban regeneration, smart city and smart citizen, the Smart Energy Master project, urban entropy and evaluation in urban planning, etc..

The conference INPUT Naples 2014 were sent 84 papers, through a computerized procedure using the website www.input2014.it . The papers were subjected to a series of monitoring and control operations. The first fundamental phase saw the submission of the papers to reviewers. To enable a blind procedure the papers have been checked in advance, in order to eliminate any reference to the authors. The review was carried out on a form set up by the local scientific committee. The review forms received were sent to the authors who have adapted the papers, in a more or less extensive way, on the base of the received comments. At this point (third stage), the new version of the paper was subjected to control for to standardize the content to the layout required for the publication within TeMA. In parallel, the Local Scientific Committee, along with the Editorial Board of the magazine, has provided to the technical operation on the site TeMA (insertion of data for the indexing and insertion of pdf version of the papers). In the light of the time's shortness and of the high number of contributions the Local Scientific Committee decided to publish the papers by applying some simplifies compared with the normal procedures used by TeMA. Specifically:

- Each paper was equipped with cover, TeMA Editorial Advisory Board, INPUT Scientific Committee, introductory page of INPUT 2014 and summary;
- Summary and sorting of the papers are in alphabetical order, based on the surname of the first author;
- Each paper is indexed with own DOI codex which can be found in the electronic version on TeMA website (www.tema.unina.it). The codex is not present on the pdf version of the papers.

SMART CITY

PLANNING FOR ENERGY, TRANSPORTATION AND SUSTAINABILITY OF THE URBAN SYSTEM

Special Issue, June 2014

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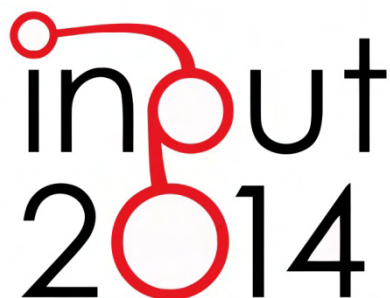
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SPECIAL ISSUE

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The logo for the INPUT 2014 conference. It features the word "input" in a lowercase, sans-serif font, with the "i" and "n" connected by a red line that forms a stylized shape. Below "input" is the year "2014" in a larger, bold, sans-serif font. The "0" in "2014" is also connected to the red line above it.

ECOSYSTEM SERVICES AND BORDER REGIONS CASE STUDY FROM CZECH – POLISH BORDERLAND

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ABSTRACT

Land-use management and planning of cross-border regions is a complex problem. Different legislatures, development visions and interests on both sides of the border make it even more complicated. Introducing ecosystem services concept into land-use planning and management at cross-border regions is a challenge. However not much is said about this issue in literature.

This paper aims to present result of the study concerning to ecosystem services concept in the context of cross-border part of Pradziad Euroregion. The studied area is situated within Czech – Polish borderland. First part of the research concerns to land-cover analyze of the region. The second one to Czech and Polish land-use strategies, which are binding at NUTS 4 and 5 level in the studied area.

Results of the research indicates asymmetry of the cross-border landscape of the analyzed region. The asymmetry is indicated by different types, biodiversities and areas of ecosystems identified on both sides of the border. It is also identified by differences in land-use strategies concerning to the region.

It is discussed to what extend ecosystem services concept can be implemented in planning legislature of the cross-border region.

KEYWORDS

Ecosystem services, Land-use management and planning, Czech-Polish borderland, Assymetries of cross-border landscape

1 INTRODUCTION

1.1 ECOSYSTEM SERVICES IN THE BORDERLANDS

As noted by MEA (2005), Ecosystem services (ES) are the different benefits people receive from ecosystems. ES include: supporting services, provisioning services, regulating services and cultural services (MEA 2005). ES concept has been growing into importance since last years. That fact is indicated by selected internationally published studies (e.g. Fisher *et al.* 2009, Tuan *et al.* 2012). Several attempts have been made to introduce ES into land-use planning and management (Scolozzi *et al.* 2012, Steiner 2014). Also the aspects of economic valuation of ES were explored as an element of policy and decision making (Laurans *et al.* 2013). Furthermore it is crucial to make the ES concept more actionable for local communities. Actionable science as defined by Palmer (2012) has the potential to inform land-use decisions, to influence policies and strategies, which affect the environment. This can be the way to pasture by Xiang (2014) “ecological wisdom for urban sustainability”.

Different national legislatures, land-use planning and management regimes, implemented policies, economic potentials, historical and political issues makes the problem of cross-border land use planning and management difficult to solve. Moreover not much have been said about ES in the context of land-use planning and management of European cross-border regions. While studying such case, firstly the diagnosis concerning to land-cover of the region needs to be made. Secondly national planning documents at local administrative level has to be analyzed in the context of ES implementation. Such approach can help to make the ES concept actionable for land-use planning and management. Outlined research method was used to analyze described in this paper case study.

1.2 THE CASE STUDY

The paper analyze the case study of the part of Euroregion Pradziad. The Euroregion is located between Poland and Czech Republic. The studied part of the Euroregion Pradziad covers an area of two Polish districts: Nysa and Prudnik and Czech district Jeseník and commune Krnov, Bruntál and Rýmařov (Fig. 1).



Fig. 1 Location of the studied region

The districts and communes are located beside the border line between Poland and Czech Republic and cover borderland part of Pradziad Euroregion. The mentioned Polish districts covers area of the NUTS 4¹. The Czech district Jeseník (communes with expanded competence) covers an area of NUTS 4 and commune Krnov, Bruntál and Rýmařov of NUTS 5. Eurostat statistics for NUTS 3 level characterizes Polish districts as “intermediate rural, remote regions” and Czech as “intermediate rural regions, close to the city”²

In Poland at NUTS 4 level district governor is responsible for preparing land-use studies, strategies and analyzes. Detailed land-use plans are prepared at NUTS 5 level. In Czech Republic at NUTS 5 level communes and NUTS 4 “communes with expanded competence” are responsible for land-use strategies, other general land-use analytical documents and detailed land-use plans.

2 RESEARCH METHOD

2.1 FIRST STEP OF THE RESEARCH

Firstly, the diagnosis concerning to ES potential at the analyzed part of the Euroregion was performed. The diagnosis was partially prepared during the student workshop, which was held in the frame of the project titled “Edu2Work Cooperation between schools and public institutions located at Czech – Polish borderland in the frame of education increases chances at labor market”. The project is conducted by Palacký University from Olomouc, Czech Republic, Central Mining Institute from Katowice, Poland with help of experts from Opole University of Technology. The five day long student workshop was held in April 2014 in Vidnava, the small town located in district Jeseník, next to the Polish border. The author lead one workshop group consisting of two students from Olomouc (Michael Cestr, Dan Horalík) and two from Opole (Dorota Michna, Michał Bartecki).

For the diagnosis following data was used: (i) Corine Land Cover (CLC) and other land-cover data available from European Environmental Agency, (ii) statistic data available from Czech Statistical Office and Polish Central Statistical Office, (iii) photographs prepared by workshop team members.

Workshop team members prepared the analyze of the region land cover. The area of the analyze covers Polish districts of Prudnik and Nysa and Czech district of Jeseník and “communes with expanded competence”, Krnov, Bruntál and Rýmařov. The analyze was prepared with use of Quantum GIS 2.2 software.

2.2 SECOND STEP OF THE RESEARCH

Secondly, the performed analyze concerns to the land-use strategies. Districts of Nysa, Prudnik, Jeseník and Krnov commune were chosen to give a general overview of the ES implementation potential in the part of Polish – Czech borderland. The aim behind this selection was to perform the analyze on the administrative level, which is large enough to cover significant part of the land. On the other hand, land-use strategies for the selected districts and commune describe in a clear way development aims and problems of the studied area. Moreover districts of Nysa, Prudnik, Jeseník and Krnov commune have comparable land-use strategies. Namely following four documents were analyzed:

- District Jeseník: Land-use strategy for Jeseník district titled “Rozbor udržitelného rozvoje území pro správní obvod ORP Jeseník”.

1 NUTS - Nomenclature of territorial units for statistics is a hierarchical system for dividing up the European Union.

2 Source: <http://epp.eurostat.ec.europa.eu/cache/GISCO/mapjobs2009/0501EN.pdf>.

- Commune Krnov: Land-use strategy for Krnov commune titled „Územně analytické podklady pro správní obvod městského úřadu Krnov“.
- District Prudnik: Land-use strategy for Prudnik district titled “Strategia Rozwoju Powiatu Prudnickiego”.
- District Nysa: Land-use strategy for Nysa district titled „Strategia Rozwoju Wspólnoty Międzygminno – Powiatowej Ziemi Nyskiej na lata 2004 – 2015”.

Inside the content of each document, potentials for implementing ES concept were searched. Czech documents were analyzed according to identified land-use problems, while Polish documents according to land-use goals. The criteria for the selection was that certain problem or goal has to refer to ES concept. Based on the outcomes of the second step of the research, some conclusions for further land-use planning and management in the context of ES concept were drawn.

3 RESULTS

3.1 FIRST STEP OF THE RESEARCH

During the first part of the study seven land-cover groups were identified. All groups reflect to Corine Land Cover (CLC) classification. Codes of that classification are given in brackets. Below list of identified land-cover groups is systematized from the ecosystems characterized by relatively little biodiversity (shades of red) into the ones characterized by high biodiversity (yellow, blue and shades of green) (Tab. 1, Tab 2):

- Urban fabric: continuous urban fabric (111) and discontinuous urban fabric (112).
- Industrial, commercial and transport units: industrial or commercial units (121), roads and rail networks and associated land (122), mineral extraction sites (131), construction sites (133).
- Agricultural areas: non-irrigated arable land (211), fruit trees and berry plantations (222), pastures (231), complex cultivation patterns (242), land principally occupied by agriculture, with significant areas of natural vegetation (243).
- Artificial, non-agricultural vegetated areas: green urban areas (141) and sport and leisure facilities (142).
- Water bodies: water bodies (512).
- Forest and semi natural areas: broad-leaved forests (311), coniferous forests (312), mixed forests (313), natural grasslands (321), moors and heathland (322), transnational woodland-shrub (324).
- Wetlands: inland marshes (411), peat bogs (412).

Moreover Nature 2000 and protected areas were identified, thanks to data available from European Environment Agency (Tab. 1, Tab 2). It was assumed that the higher biodiversity of certain ecosystem, the better potential to supply different ES.

Results of the first part of the study indicates **asymmetry of the cross-border landscape** of the analyzed region. The asymmetry is characterized by different types and areas of ecosystems identified on both sides of the border, their different biodiversity and different percent of each land-cover group on both sides of the border. Moreover identified on both sides of the border ecosystems have different potential to supply and absorb ES. The asymmetry is also indicated by following issues concerning to demographic data and land-cover (Fig. 2, Tab. 1, Tab 2):

- Higher amount of inhabitants on the Polish side of the region.
- Much higher density of urban fabric at the Polish side of the region.
- Much higher density of agricultural areas, dominated by non-irrigated arable land, on the Polish side of the region.
- Much higher density of forest and semi natural areas on the Czech side of the region.

- Much higher density of wetlands on the Polish side of the region.
- Much higher density of Nature 2000 and protected areas on the Czech side of the region.

CLC GROUP	CLC CODE	AREA [HA]	GROUP AREA [HA]	PERCENTAGE OF THE REGION [%]	AMOUNT OF INHABITANTS
Urban fabric	111	0,00			
	112	6 953,07	6 953,07	3,09	
Industrial, commercial and transport units	121	849,78			
	122	0,00			
	131	208,75			
	133	53,64	1 112,17	0,49	
Agricultural areas	211	41 339,61			
	222	0,00			
	231	35 729,61			
	242	131,95			
	243	26 325,20	103 526,37	46,07	
Artificial, non-agricultural vegetated areas	141	0,00			
	142	215,80	215,80	0,10	
Water bodies	512	869,76	869,76	0,39	
Forest and semi natural areas	311	4 951,87			
	312	66 700,30			
	313	28 390,54			
	321	301,15			
	322	104,15			
	324	11 540,49	111 988,50	49,83	
Wetlands	411	0,00			
	412	54,54	54,54	0,02	
Nature 2000		60 429,31	60 429,31	26,89	
Protected areas		54 788,87	54 788,87	24,38	
Analized region		224 720,20	224 720,20	100,00	136 062

Tab. 1 Land-cover and inhabitants amount of the Czech part of the analyzed region

Figure 2 compile each identified group of natural ecosystems (yellow, blue and shades of green) with high ability to supply ES (high biodiversity) with identified gropes of antropogenized ecosystems (shades of red) with high demand for ES (low biodiversity).

This analyzes indicates higher potential to supply ES on the Czech side of the region and higher demand for ES on the Polish side of the region (Burkhard *et al.* 2012). This fact is also confirmed by higher amount of inhabitants on the Polish side of the region (Tabb. 1,2).

Moreover, indicated in yellow, blue and shades of green land-cover groups (ecosystems) can be described as "service providing areas" (SPAs), while land-cover groups indicated in grey as "service benefiting areas" (SBAs). Following Fisher *et al.* (2009) and Syrbe & Walz (2012) SPAs as should be understood as "spatial units that are source of landscape services". While the same authors describe SBAs as spatial units, which can be characterized by "demand" for services and are complement to SBAs. Polish part of the region has higher amount of SBAs, Czech part of SBAs. That strenghts the cross-border landscape assymetry. In cases

when SPAs and SBAs are not contiguous Syrbe & Walz (2012) defines service connecting areas (SCAs), which link providing and benefiting areas³.

CLC GROUP	CLC CODE	AREA [HA]	GROUP AREA [HA]	PERCENTAGE OF THE REGION [%]
Urban fabric	111	64,82		
	112	10 119,44	10 119,44	5,68
Industrial, commercial and transport units	121	581,92		
	122	26,34		
	131	211,15		
	133	0,00	819,41	0,46
Agricultural areas	211	121 841,69		
	222	28,34		
	231	8 220,09		
	242	4 524,43		
	243	5 974,75	140 589,30	78,93
Artificial, non-agricultural vegetated areas	141	304,93		
	142	397,14	702,07	0,39
Water bodies	512	2 424,18	2 424,18	1,36
Forest and semi natural areas	311	7 538,44		
	312	6 881,95		
	313	6 298,71		
	321	542,19		
	322	25,07		
	324	1 367,42	22 653,78	12,72
Wetlands	411	820,25		
	412	0,00	820,25	0,46
Nature 2000		9 910,99	9 910,99	5,56
Protected areas	14 069,97	14 069,97	7,90	
Analyzed region	178 193,25	178 128,43	100,00	198 842

Tab. 2 Land-cover and inhabitants amount of the Polish part of the analyzed region

3.2 SECOND STEP OF THE RESEARCH

Land-use strategy for **Jesenik district** describes 10 thematic areas: geological environment and geology, water regime, environmental hygiene, nature and landscape protection, agricultural land and land designated for forestry, public transport and technical infrastructure, socio-demographic conditions, housing, recreation, economic conditions (Ekotoxa 2010). All those thematic areas are obligatory for land-use strategies in Czech Republic prepared for NUTS 4 and 5 regions. Four thematic areas were selected to search for connections with ES concept: (i) environmental hygiene (ii) nature and landscape conservation, (iii) agricultural land and land designated for forestry, (iv) recreation. For selected thematic area several, described in the analyzed document, problems were selected. The selection was made according to potential of implement ES concept (R – regulating services, P – provisioning services, C – cultural services; Tab. 3).

³ Service connecting area (SCA) can include river valley, ecological corridor, hollows, etc.

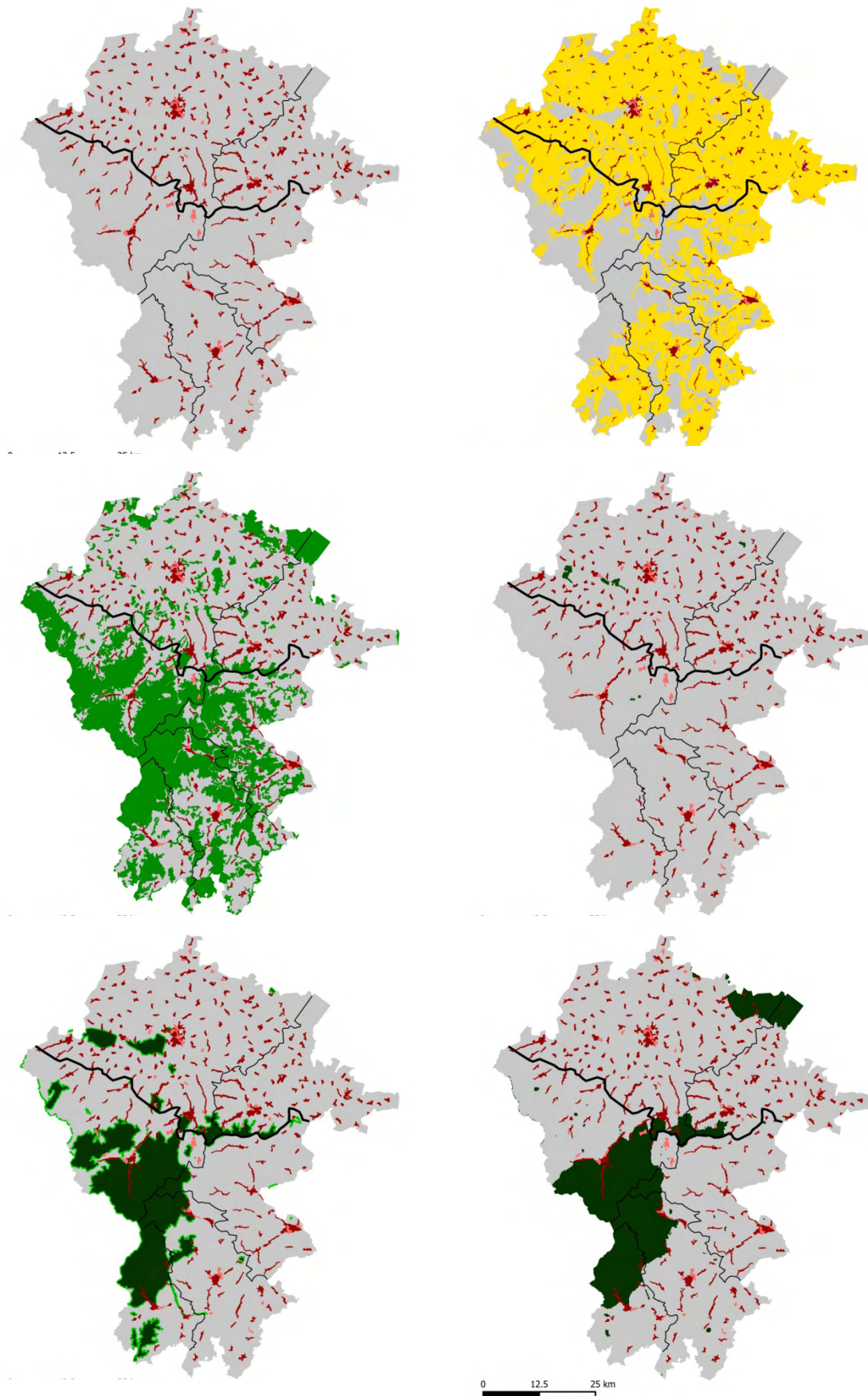


Fig. 2 Land-cover of the analyzed region

THEMATIC ANALYZE	IDENTIFIED PROBLEMS	ES
Environmental hygiene	– Ensure sufficient area to increase forest coverage and purposeful planting of greenery (– P,R
Nature and landscape conservation	– Expansion of buildings in the open countryside and fragmentation of the landscape	– R
	– Clashes with ecological corridors	– R
	– The creation of conditions for the preservation and expansion of scattered vegetation in the landscape	– P,R
	– The creation of erosion control measures	– P,R
Agricultural land and land designated for forestry	– Forest protection	– P,R
	– Exploit the possibilities of forestation of unused agricultural land	– P,R
Recreation	– Unused potential of good natural and cultural assumptions of local landscape	– C
	– No need to worry about exceeding the limits of ecological sustainability in the context of tourism development	– C

Tab. 3 Potential of implementing ES concept in Jeseník district

In land-use strategy prepared for **Krnov commune**, for each obligatory thematic area, SWOT analyze was prepared (Haluzá, 2008). After SWOT analyzes main land-use problems areas were identified and described in four following categories: (i) problems in the field of communes spatial development, urban problem, total 56 problems (ii) transport problems, total 12 problems (iii) ecological problems, total 61 problems (iv) water regime problems, total 6 problems. The document is more detailed than the one concerning to Jeseník district, however issues concerning to ES are packed mostly into one problem area namely “ecological problems” (Tab. 4).

ECOLOGICAL PROBLEMS REVERE TO FOLLOWING ISSUES	ES
– Change of local ecological corridors into dysfunctional	– P,R
– Continuity of local ecological corridors	– P,R
– Minimum width of local ecological corridors	– P,R
– Disabled functionality of local biocenters	– P,R
– Size and connections of local biocenters	– P,R

Tab. 4 Potential of implementing ES concept in Krnov commune

Land-use strategy for **Prudník district** defines eight strategic goals: (i) economic, cross-border cooperation, (ii) arrangement of natural environment - technical infrastructure and system solutions, (iii) tourism - the use of historical, cultural and environmental aspects, (iv) education adapted to the labor market and lifelong learning, (v) activation of food processing and shaping of agricultural restructuring, (vi) improving the quality of life and ensuring the stability and prospects for the local community, (vii) preservation of spatial order and sustainable development, (viii) better efficiency of development planning (Klepacz 2000). From the above listed, strategic goals number two, three, five and seven were selected for further analyze concerning to ES concept (Tab 5).

STRATEGIC GOAL	DETAILED STRATEGIC GOAL	ES
Arrangement of natural environment - technical infrastructure and system solutions	– Natural environment inventory of Pradziad Euroregion	– P,R,C
	– Improvement of communication infrastructure solutions with attention to natural environment impact	– R
	– Adjusting the riverbeds and increase flood safety	– R
	– Increase flood safety and protection of water potential by building retention reservoirs	– R
	– Protection of meadows melioration and planting crops in mid-field open spaces	– R
	– Improving the quality of soil	– R
Tourism - the use of historical, cultural and environmental aspects	– Using the landscape potential to build bike routes and touristic paths	– C
	– The development of agritourism	– C
Activation of food processing and shaping of agricultural restructuring	– Adoption of a comprehensive program concerning to processing of agricultural products	– P
Preservation of spatial order and sustainable development	– Economic activation along Osobłoga river	– P,R,C

Tab. 5 Potential of implementing ES concept in Prudnik district

Land-use strategy for **Nysa district** defines seven strategic goals and eight operational goals: economy, agriculture and rural areas, infrastructure and communication, social infrastructure, culture, natural environment protection, tourism, cross-border and interregional cooperation (Rada Powiatu w Nysie, 2004). In three operational goals detailed proposals concerning to ES were identified (Tab 6).

OPERATIONAL GOAL	INCLUDED PROPOSALS	ES
Economy	– Sustainable development of the sub region	– P,R
	– Enhancing development of agriculture	– P
Natural environment protection	– Increasing the area and protecting forests	– P,R
Tourism	– Building infrastructure like: paths, bike and water routes	– C
	– Promoting eco-tourism and agro-tourism	– C
	– Using the existing nature potential for tourism development	– C

Tab. 6 Potential of implementing ES concept in Nysa district

4 DISCUSSION

“Task Force” group consisting of representatives of following institutions: Czech and Polish Euroregions, the Czech – Polish cooperation managing institutions, national coordinators and other Czech and Polish stakeholders, has selected several Czech – Polish investment priorities. Among those priorities issues concerning to: (i) “protecting, promoting, developing of national cultural and natural heritage” and (ii) “protecting and restoring biodiversity, soil protection and promoting ecosystem services including NATURA 2000 and green infrastructure” were included (Opolska Fundacja Inicjatyw Międzynarodowych 2013). That

fact indicated rising understanding of ES concept and need for more detailed incorporating it into national land-use planning / management regimes.

Two reasons indicates “asymmetries” of the Czech and Polish land-use strategies prepared at NUTS 4 and 5 level. Firstly, land-use strategies are not obligatory documents for Polish districts (NUTS 4). However many of Polish districts decide to prepare such documents. Polish land-use planning system assumes that general land-use decisions are taken firstly at national level and then at voivodeship level. Detailed decisions are described at commune (city) level (NUTS 5). While in Czech land-use planning system it is obligatory to prepare land-use strategies at the level of NUTS 4 / 5. That is the basic reason why Czech documents are more detailed than Polish ones. Secondly, Czech and Polish documents have different structure (Ministerstwo Budownictwa Rzeczypospolitej Polskiej *et al.* 2006). Czech land-use strategies revere obligatory to following thematic analyzes: geological environment and geology, water regime, environmental hygiene, nature and landscape protection, agricultural land and land designated for forestry, public transport and technical infrastructure, socio-demographic conditions, housing, recreation and economic conditions. That makes the structure of Czech documents clearer that structure of Polish documents. It also allows Czech document to be more precise that Polish ones. More detailed Czech land-use strategies, obligatory at NUTTS level 4 / 5, are better tools for incorporating ES concept into land-use management and planning. This fact, together with bigger demand for ES on the Polish side, creates the risk of uneven use of ES in the analyzed region. This indicates the need for better implementing ES idea into Polish land-use management and planning systems at NUTTS 4 level.

Asymmetries of Czech and Polish land-use strategies makes ES idea difficult to implement in cross-border land-use planning and management. However, implementation of most of the selected in this study development problems and development / operational goals influence ecosystems in way they are able to provide different services (Tab. 3, 4, 5, 6). Some of the identified land-use problems and goals concerning to fragmentation of the landscape, forestation and forest protection partially overlap on both sides of the border. In general identified land-use problems / goals revere mostly to provisioning (P) and regulating services (R). Analyzed data is not enough detailed to assess precisely which of those two ES categories are represented more often. Nevertheless, it is more clear where cultural ES (C) are influenced (Tab. 3, 4, 5, 6). That fact show high importance of cultural ES for the analyzed region and for the construction process of the cross-border region (Paasi 2010).

How l-u planning and management documents concerning to different borderland regions can revere to ES concept? This should be implemented in few steps. Firstly by diagnose what kind of asymmetries characterizes certain borderland. Diagnosis should concern to land-cover of the borderland area and land-use legislature. Secondly by identifying where and what kind of ES demands occur in particular area and who has those demands (Ernstson 2013). Thirdly by arranging bilateral discussion about land-use goals (existing and planned) concerning to both countries (Spyra 2014). This discussion should lead to defining bilateral land-use goals taking into account ES. Monetary values of certain ecosystems should be used as arguments during this process. Those bilateral goals should be included in national land-use documents, preferably at NUTS 4/5 level. Other possibility is that agreed land-use goals concerning to ES could be described in bilateral document, sort of cross-border land-use strategy.

Future research needs, concerning to the studied thematic area, refers to several issues. Firstly more detailed diagnosis concerning to land-cover / use should be performed. Calculations could be based on more precise data available at the basis of INSPIRE regulations⁴. Then more detailed outcomes of the diagnosis would allow to analyze detailed land-use plans of selected communes (NUTS 5), located beside the border.

⁴ INSPIRE - Infrastructure for Spatial Information in the European Community.

With the help of such results, service connecting areas (SCAs) can be defined and thus, reducing the risk of uneven use of ES in the analyzed region, can be obtained. SCAs should be clearly described in Polish and Czech detailed land-use plans at NUTS 5 level.

5 CONCLUSIONS

Continuous efforts are needed to better introduce ES concept into land-use strategies concerning to borderlands. Each cross border landscape and cross-border region can be characterized by certain asymmetry on both sides of the border. The asymmetry has to be included as important factor influencing land-use planning and management of the cross-border region. In the discussed case study asymmetry of the landscape are indicated by land-cover and demographic issues. Dynamic of spatial supply and demand of ES in connection with SPAs and SBAs of ES co defines asymmetry of the cross-border landscape (Burkhard et al, 2012, Syrbe & Walz, 2012). That issue should be the basis for further consideration of ES potential in land-use planning and management of the studied region. Land-use strategies should describe possible tools for minimizing negative impacts of cross-border landscape asymmetry. Necessary to describe in land-use documents actions should concern to:

- Disproportion of SPAs and SBAs in the analyzed region
- Lack of clearly defined cross-border service connecting areas SCAs (Syrbe and Walz 2012)
- Identifying what kind of ES demands are characteristic for the analyzed region (Ernstson 2013)

Moreover asymmetry of the functional region is indicated by differences in land-use legislation. Land-use strategies covering whole cross-border area are needed.

To make the ES concept actionable for the cross-border region and to use it as a part of cross-border region "construction process" it must be open (and understandable) to different stakeholders on both sides of the border. It can not be left only to researchers and politicians (Jax *et al.* 2013).

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IMAGES SOURCES

Fig. 1: author Spyra M.; Fig. 2: authors Bartecki M., Cestr M., Horalik D., Michna D., Spyra M.

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