Socio-Ecological Practice Research for Sustainable Landscape Governance

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Author: Jianguo (Jingle) Wu [1]
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Title*: Ecological civilization, socio-ecological practice research, and sustainability science*

Abstract: Ecological civilization is a new kind of civilization – human civilization in harmony with nature, which represents an ultimately sustainable relationship between humans and the environment. Different from the agricultural and industrial civilizations, both of which could be characterized by humans conquering, domesticating, and exploiting nature, ecological civilization aims to balance development and conservation, and minimize human ecological footprints, so that people and nature can both thrive in the long term. While this sounds familiar and resonant with the theme of our time, I argue that ecological civilization must be based on a comprehensive and solid science foundation if it is to be more than just a political slogan or a utopian aspiration. This needed science foundation is sustainability science, and socio-ecological practice research is necessary to implement sustainability science-guided ecological civilization on the ground.

Author: Robert M. Scheller [1]
[1] *Forestry and Environmental Resources, North Carolina State University, USA*

Title: *Landscape trajectories under climate change and climate adapted management.*

Abstract: Concern over global change has prompted debate about whether active management can accelerate landscape adaptation to novel conditions, maintain resilience, and continue the provision of ecosystem services. Forest scientists and managers have proposed many innovative approaches including facilitated migration, genomic interventions, restoration silviculture, and many others. Few of these innovations have been tested at broad scales because of the difficulties of testing them at scale and because the full effects may not be known for decades. My lab and I use forecasting to test innovative solutions to global change and to assess how they may interact with climate futures and novel disturbance regimes. Forecasting does not provide predictions about what will or will not succeed or fail. Rather, it provides information about potential trade-offs and costs and can inform the discussion before innovations are executed at broad scales. Our results suggest that landscape structure and function will decline as the magnitude of climate change increases. This decline will be highly variable across landscapes and is dependent on both natural and managed resilience. Climate adaptive management could maintain or even increase ecosystem services although radical interventions may be necessary. We conclude that for any landscape, a range of landscape trajectories are possible and that comprehensive management efforts have the potential to redirect trajectories towards more positive outcomes.

Author: Christine Fürst [1]
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Title*: Bringing Nature and People together – Challenges in managing sustainably Human-Wildlife Interactions*

Abstract: Social-Ecological Research in Practice is confronted with manifold challenges in how to characterize the relations between humans and their environment. A particular example is the management of human-wildlife interactions which might be characterized by highly biased impacts on both sides. Rewilding and the "spirit of nature" are motives for enhancing human-wildlife interactions that can be often found in developed countries and herein more in urban areas. Contrariwise, conflicts, fears and mutually negative impacts arise more in developing countries or in poorly developed areas. More recent developments show however, that human-wildlife interactions are moved more and more toward urban areas since these are often more diverse considering their niches and habitat qualities for a multitude of animals and also due to the increasing trend of urbanization which stretches more and more into formerly untouched areas. This talk summarizes some key trends considering perceptions and experiences in human-wildlife interaction and it sustainable development brought up in an international workshop supported by Future Earth DKN in 2019.

Author(s): Jiquan Chen[1]

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Title: *$· Person-1·Yr-1 ·mm-1: An integrative Metric for SESometry*

Abstract: Ecologists have developed a long list of quantitative measures to measure status and change in ecological systems. Simultaneously, scholars from socioeconomic fields have their own ways of describing social systems. As the scientific community ventures toward integrated research on social-environmental systems (SES), we need to connect these discipline-specific metrics to enable meaningful interpretations of SES dynamics and functions. In the absence of a coupled metric, spatial and temporal changes are examined in parallel and trends must be compared. A few integrated measures have been put forth in recent research; some are intuitive, but others may appear awkward to researchers from physical and social science. Gross domestic production per capita (GDPpc, $ per person), for example, has been widely applied to assess the economic condition of an administrative entity. Would an integration of GDP, population, ecosystem production and water loss (e.g., evapotranspiration, ET) per person be meaningful with a unit of $·Person-1·Yr-1 ·mm-1? Our objective of this paper is to stimulate the community with a new measure on SES functions and dynamics, termed SESm1. We present potential meaning and applications of SESm1 based on data from 20 administrative entities across the Asian drylands to demonstrate the (in)validity of this approach. The advantages and disadvantages of each of these integrated measures is also discussed. Mathematical and empirical connections between SESm1 and its components, as well as with other independently measured variables are explored at provincial and national levels.

Keywords: *New Metric, Socioeconmic-Ecological System, drylands*

Section 1. *European Landscape Convention – 20 years. Best practice examples: from scientists to practitioners*

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Title: *The approach to typology of biocultural landscape in Slovakia* (oral presentation)

Abstract: Biocultural landscapes integrate both natural and cultural elements that interact giving a particular character to the landscape that man shaped for centuries adding permanent disturbance into the system. The aim of this article is to present approach to typology of biocultural landscape in Slovakia that based on previous classifications of cultural landscape and their role in interaction of natural elements and increase of the biotic and biocultural value of the landscape. For classification, we used multi-criterial analysis in GIS including indicators reflecting natural, cultural and biocultural values of the landscape. The main types of biocultural landscape represent traditional meadow-pasture landscape, traditional vineyard landscapes, traditional landscape with dispersed settlement, traditional mining landscape, biocultural landscape with historical water buildings, and biocultural landscape with different historical elements. This work was supported by the Scientific Grant Agency of Ministry of Education of the Slovak Republic [No. 2/0078/18 "Research of biocultural values of landscape"].
Keywords: landscape typology, cultural value, natural elements, relationship

2. Author(s): Andreea Nita [1,2] , Ileana Stupariu [1]
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Title: *The role of an international treaty in creating over time a sustainable network for landscape interdisciplinary approaches* (oral presentation)

Abstract: The European Landscape Convention (ELC) of the Council of Europe represents the first international treaty concerning all aspects of European landscape. Through this convention, public authorities have been encouraged to adopt policies and measures at local, regional, national and international level in order to protect, manage and properly plan landscapes in a sustainable manner. Our study aims to provide a better understanding of the landscape governance research trends. For this, we analyze 450 published articles in international journals specialized in landscape conservation between 2000 and 2020. We use bibliometric indicators (i.e. keywords) in order to discover the landscape research trends and evolution in the past 20 years. Furthermore, for each article we assigned different attributes in order to perform a more detailed analysis of the ELC aspects covered (such as: only reference in the text or to the law; provides the ELC landscape definition; discusses the implementation of ELC in general; or the fact that the adoption of ELC encouraged the identification / characterization / protection / conservation of the natural landscape; refers to ELC as a "policy instrument"; either the research promotes the landscape perception of

the local people or various stakeholder groups, etc.). Our results highlight the evolution of the most common trends of ELC and tries to identify the perspectives of landscape conservation by providing insights for the future and sustainability of the landscape.

3.Author(s): Marioara Pascu[1]
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Title: *The assessment of the authenticity and conservation status of Hărman cultural property* (poster presentation)

Abstract: The vernacular architectural style is on the risk of disappearing in Transylvania as a result of the depopulation of the Saxons villages of German origin in consequence of massive migration to Germany. The nomination of Hărman cultural properties on the UNESCO list is part of an international legal framework. The proposed area includes a 63,47 ha perimeter of the historic centre of Hărman consisting of a compact group of 260 houses and the entire fortified Evangelical Church. The assessment of the authenticity and conservation status of Hărman cultural property was carried out by applying the criteria: form and design, materials and substances, use and functions, location and positioning which are applicable to the tangible features of the landscape. The authenticity assessment based on sheet inventory, applied individually on each building, concluded that from a total of 260 Saxons buildings, 19.23 % benefit from exceptional authenticity, 33.46 % from good authenticity, 31.92 % - medium and 15.38 % - low. The proportion of buildings in a low authentic status is relatively low (15.38%), which is favourable to the nomination. Moreover, the percentage share of those with exceptional and good authenticity amounts to 52.69 %. The in situ assessment found that 68.84% of all buildings analysed are in very good conservation status, 23.46% are in good condition, 5.76% - acceptable and 1.92% in a degraded state. As for the evaluation of intangible heritage, it was achieved by applying the criteria: traditions, techniques and management system, language and other forms of intangible heritage, spirit and feelings. The results have shown that the following forms of intangible heritage are currently preserved in the Saxons choir, the Symphonic series of Barcensis in the Barsei country fortresses etc. The results also showed that 80% of the subjects have a strong historical feeling for the historical landscape

4. Author(s): Diaz-Maroto Ignacio J. [1]
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Title: *European Landscape Convention: a model of landscape-based territorial development* (oral presentation)

Abstract: In a global concept, the landscape provides the framework for knowledge and territorial analysis, policies for sustainable development and environmental processes cultural, and socioeconomic taking place in it. In late years, the landscape recognition, conceived as a resource demand suitable protection, planning and management, led to its legal recognition. On 20 October 2000, the European Council in Florence backed up the "European Landscape Convention", being ratified by Spain on 26 November 2007. Note the new legal protection covers all landscapes, both the most beautiful and the most degraded, and it demands for the latter, the implementation of the measures for its recovery and conservation. According to the competence division recognized in the Constitution Spanish, the State only has taken some measures such as the landscape references in the "Law on Land and Urban Rehabilitation". Then, the role in landscape policy corresponds to the Autonomous Communities, according to the suggestions of the Council of Europe for the implementation of the Convention: i) use tools of territorial organization; ii) develop specific instruments. In June 2008, the Galician Landscape Protection Law was approved, which include the guidelines from the European Landscape Convention. And, in May 2010, Galicia became member of the European Network of Regional and Local Entities to the implementation of said agreement. The landscape must be a factor that complete and integrate regional policies, urban planning, and environmental protection, as well as any sectoral policy which promotes a direct or indirect impact on the environment. The Galician Territory Management Guidelines define a new territorial model, establishing spatial settlement patterns of the sectoral activities. In this model, rural area occupies most of the land and is a vital for the development. It is characterized by a great landscape diversity results in differences in the natural environment and human action over time. It has a high density of territorial occupation, derived from a heterogeneous settlement system, with a network of more than 30,000 population entities of unequal size and different organizational models, distributed in a dispersed way (75% do not reach 50 inhabitants, and a bit more than 13% of the population of Galicia resides in it). The parish is the smallest unit of grouping of settlements and the main reference in its economic and social organization.

Keywords: Territorial planning, Landscape protection, Rural area, Galician territorial model

5. Author(s): Andreea Nita[1], Alina – Constantina Hossu[1], Cristina Gabriela Mitincu[1], Athanasios Alexandru Gavrilidis[1], Mihai Răzvan Niță[1]
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Title: *Multilateral agreements cooperation to minimize environmental impact* (poster presentation)

Abstract: Improving the quality of the environment and preserving landscape resources for future generations has been a subject of national policies in the last centuries. The number of agreements increased significantly as a result of the severity of environmental issues and increasingly degraded environment. Time has shown that these treaties have helped to reduce these past issues, but we

are constantly evolving, and we are currently facing more stringent environmental problems such as climate changes, land-use changes, species extinction, excessive pollution, massive deforestation. Scientific research over the last decade shows that the optimal perspective in terms of environmental governance and landscape management emphasizes collaboration between all institution and stakeholders involved, from local to regional, national and international, paying particular attention to the socio-ecological perspective and the structure for the implementation of good practices. However, the gap between the legislative and practical part is still being discussed as the main cause of the environmental problems that society is currently experiencing. Therefore, their investigation as a whole can lead to finding out some structural features that can offer advice for improvement and, respectively, ways to improve and overcome existing barriers. To achieve successful environmental governance is only possible with the involvement of all parties or stakeholders. This paper tries to illustrate the evolution of the network of cooperation established between the international parties that ratified the most important environmental treaties at international level discussing transboundary issues. Through our analyses, we determine the dynamic of the network and examine the core-periphery model, which shows the current situation in terms of the level of involvement in the ratification and application of the principles of the environmental treaties established at international level.

Keywords: impact assessment, environmental governance, multilateral agreements, EIA, SEA

Section 2. Novel technologies, instruments, modelling and knowledge implementation in Geo and Life Sciences

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Title: *A BoD-DEA approach to constructing Sustainable Rural Development Indicators* (oral presentation)

Abstract: Sustainable Rural Development is key to maintain active local communities in rural and semi-natural areas while avoiding depopulation in these territories. Assessing regional development in these areas is necessary to improve decision-making processes in order to define sustainable public policies for rural communities, while ensuring nature conservation. Even though rural areas often overlap with high ecological value sites, the environmental components of sustainable rural development indicators have not been pinpointed enough. The objective of this work was to propose a new sustainable rural development composite indicator (nSRDI) considering an environmental sub-indicator based on the assessment of vulnerability of ecosystem

services. The proposed model allows aggregation of social and economic sub-indicators through an efficiency approach and aggregation of the environmental sub-indicator through a vulnerability approach using a BoD-DEA (Benefit of Doubt - Data Envelopment Analysis) method. We applied the model in 10 regions containing 189 rural municipalities in Huesca (Spain) to obtain a sustainable rural development ranking of regions. The vulnerability component of the environmental sub-indicator was established based on a reference protected area, the Ordesa and Monte Perdido National Park (OMPNP) in Huesca. The environmental sub-indicator and the composite index were further tested through the analysis of the effect of different weighting methods (equal and optimal) on scores and resulting rankings of regions. Results showed substantial differences in nSRDI and environmental sub-indicator scores when vulnerability was taken into account. This suggest that environmental component and the perspective from which it is addresses is important to deal with sustainability and rural development.

Keywords: Sustainable Rural Development Indicators, DEA models, vulnerability, ecosystem services

2. Author(s): Taisser H. H. Deafalla[1]
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Title: *Assessing Object-based Analysis for Mapping Land Cover/Land Use and its Change in Semi-arid Regions* (oral presentation)

Abstract: In semi-arid regions such as Nuba Mountains of Sudan where the study located, the areas are spatially heterogeneous and with a similar spectral response, LU/LC mapping with remotely sensed data encounters a complexity of problems when applying methods based on spectral information and ignoring spatial information. Therefore, for this study, the Object based Approach has been proposed for discriminating different LC classes based on group pixels with analogous spectral and spatial response, based on predefined criteria to extract features of interest. Sixteen Landsat imagery data time series over the study site were used to classify and detect the transformations in the landscape during the period from 1984 to 2019. Beside the ground reference data, Google Earth maps were used to develop and control the signatures as well as for the accuracy of the classification. Additionally, the study subsequently utilized an improved method for the analysis of satellite images, based on integrating multiple features namely; NDVI, MNDWI, SAVI, DEM and Thematic layer. Multi-date post-classification comparison change detection was performed to investigate LC change in the study area during the study period. Then to evaluate the results of conversions, moreover Geographic Object-Based Change Detectio was applied to quantify and locate the change. The use of object based approach has proven that it has provided offers of unprecedented opportunities, to classifier and detects the changes in LU/LC more accurately, over large areas, with diminishing costs and processing time. In sum, more new studies that integrate model-based terrestrial and remotely sensed data, to highlight the need of understanding the context of LU/LC, are required to more

understanding the dynamics, predicting the patterns and trend of changes as well as for improving land management policies to meet the increasing demands for basic human needs and welfare.

3.Author(s): Daniele La Rosa[1] , Massimo Palme[2,3], Riccardo Privitera[1]
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Title: *Green Infrastructure in private residential areas: Building Performance Simulation for Urban Planning* (oral presentation)

Abstract: Over the past decades, intense urbanization processes have produced built environments with a low energy efficiency and a severe lack of green spaces, which represent the main providers of ecosystem services in cities and play a relevant role in regulating the local microclimate. Among the different natural processes involved in climate regulation, a fundamental role is played by the shading effects of urban vegetation on buildings and built environment. Consequently, urban planning strategies aimed at designing a Green Infrastructure (GI) can have significant impacts on reducing the energy demand of cities while providing new green spaces for the local community. This is particularly relevant in high density settlements, where urban morphology types such as multi-storey apartment buildings represent an important percentage of the entire built environment. Despite its importance, the implementation of a GI from public administrations must often challenge the lack of economic resources to acquire and manage private land to be set as new urban green spaces. This article investigates the potential energy savings for multi-storey apartment buildings that can be achieved by shading effect of trees. Particularly, building performance simulations are carried out considering different configurations of key parameters, such as trees species, distance to buildings, orientations of buildings and actual room of open spaces beside buildings where to plant new trees. The simulations are run for a real urban case study located in the metropolitan area of Catania in southern Italy. Simulations of shading effect are carried out considering three species of trees and 41 different configurations depending on actual availability of open spaces around buildings. Results show that relevant energy savings can be obtained when the entire façades of buildings are shaded. From an urban design point of view, results also suggest that the distance of trees from buildings and the actual availability of room for trees are key aspects to consider when design where and how to plant new trees. Findings of this work support urban planning for the choice of different scenarios and alternatives of GI to better balance public and private costs and generate wider benefits for the local communities.

4. Author(s): **Yamina Micaela Rosas**[1], **Pablo Luis Peri**[2], **Maria Vanessa Lencinas**[1], **Guillermo Martinez Pastur**[1]
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Title: *Potential biodiversity maps of multiples taxonomic group to support conservation strategies at different scales* (oral presentation)

Abstract: Different spatial analyses were developed for biodiversity conservation. Maps of potential biodiversity (MPB) define the distribution and ecological requirements of key species, while maps of priority conservation areas (MPCA) define priority areas considering endemism and richness. The objective was to test the efficiency of MPB and MPCA to support conservation strategies at different spatial scales based on taxonomic groups using potential habitat suitability (PHS) in Santa Cruz province (Patagonia, Argentina). We obtain PHS maps by Biomapper software using 119 species (huemul, birds, lizards, darkling-beetles, plants) and 40 explanatory variables. PHS were combined into a GIS project to obtain a single MPB and different MPCA using Zonation software. ANOVAs and PCAs compared both methodologies among treatments (environmental variables, ecological areas, forest types, and protected areas). Modelling approach used climatic (n=6), topographic (n=2) and landscape (n=7) variables. PCA and MPB indices (marginality and specialization) showed that lizards and darkling-beetles presented the lowest marginality value related to dry-steppes. Birds and plants presented large range of marginality and specialization values related to different ecosystem types, e.g. humid-steppes and shrub-lands, Nothofagus antarctica forests and ecotone areas. Huemul had the highest marginality value related to N. pumilio forests and alpine vegetation. At regional level, the highest MPB and MPCA values were related to shrub-lands and humid-steppes. However, MPCA also showed high values related to forests and alpine vegetation due to endemism, while only MPB highlighted differences along forest types. The representativeness analyses using MPB showed that highest potential biodiversity values did not well represented inside natural reserves, however MPCA detected some high values inside reserves. We conclude that outputs of different spatial analyses (MPB or MPCA) were similar at regional scale, but different at local scale or in ecological areas. Both methodologies can be used for different conservation strategies (e.g. highlight richness or endemism).

Keywords: habitat suitability, ENFA, Zonation, Southern Patagonia

5. Author(s): Yulia Mishlanova[1]**, Andrei Zaitsev**[1]**, Svetlana Kulakova**[1]**, George Voronov**[1]
[1] *Perm State University, Russia*

Title: *Approaches to the study of vegetation and wildlife in the process of environmental impact assessment* (oral presentation)

Abstract: Environmental impact assessment materials should contain a description of vegetation and wildlife, an assessment of possible changes in components because of human exposure. The methodological support of such works is poorly developed in Russia. Therefore, difficulties arise in the preparation of these sections of the pre-project documentation. The article contains the author approach and a list of criteria for the successful development of the subsections under consideration, based on the authors' own experience and synthesis of existing methods, techniques and regulatory support.

6. Author(s): Cristina Covătaru[1], Ovidiu Frujină[1], Cornelis Stal[1], Cătălin Lazăr[1]
[1] University of Bucharest, Romania

Title: *Cultural Landscape documentation as a part of Sustainability Development. Study case: Sultana Valea Orbului archaeological site* (oral presentation)

Abstract: The three established dimensions of sustainability development regards the ecological, economic and social areas. Recently, culture has been mentioned as an aspect of social sustainability or as a separate dimension and it is associated with tangible or intangible cultural heritage. Evidences of prehistoric adaptation and exploitation of the surrounding natural environment for usable resources, formation of settlements, cemeteries areas or cultivation, represent a part of cultural heritage, namely cultural landscape, defined as a "combined works of nature and of man". Nowadays, landscape protection is a major issue on a global scale, being increasingly threatened by natural and anthropic factors, such as climate change, urbanization and intensive agriculture land use. From a sustainability development point of view one major problem seems to be the source of conflict between urban expansion and preservation of cultural territories. Because not everything can be preserved for future generations, the problem of conservation it about how to preserve cultural heritage. Inspired by the potential uses of remote sensing technology, this study is a presentation of the challenges and opportunities, current experiences and prospects of using UAVs to monitor the archaeological sites. In this respect, the case study of Sultana-Valea Orbului archaeological site, Călărași, SE Romania, will be presented in the content of this presentation. This work was supported by a grant of the Romanian Ministry of Research and Innovation, project number 15PFE/2018.

7. Author(s): Mihai Tentis[1], Marina-Mariana Tentis-Tanase[1]
University of Bucharest, Faculty of Geography, Romania

Title: *Automatic analysis of the land use evolution using satellite images* (oral presentation)

Abstract: This research proposes a closer look to the land use transformations using various algorithms for the real-time analysis process. Based on Google engine capabilities we will highlight the land usage tracking process and how this approach might help various communities.

8. Author(s): Alin-Ionuţ Pleşoianu[1], Lucian Drăguţ[2], Mihai-Sorin Stupariu[3], Ionuţ-Cosmin Şandric[3]
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[3] University of Bucharest, Romania

Title: *A deep learning ensemble design based on Single Shot Detector for individual tree detection in disparate remote sensing datasets* (oral presentation)

Abstract: Individual tree crown (ITC) detection and delineation is a central subject of interest in forestry and remote sensing and. While traditional methods for ITC detection and delineation (image classification, segmentation, template matching, etc.) on remote sensing imagery have achieved good results, it has been shown that no single method is robust enough to work properly on disparate landscape types or image resolutions. Recently, deep learning has emerged as a powerful tool for remote sensing due to its superior performance and versatility for applications ranging from object detection to image classification. Deep learning has been employed in ITC detection and delineation even since the breakthrough of this technique in the field of remote sensing. Single deep learning models have been used to successfully detect and map individual tree crowns and to detect trees. Although single models have found great performance, with constant rates of ~90%, studies have put emphasis on the need for testing disparate and complex study areas, include a variety of tree species and incorporate different resolution imagery. In this study, we designed and employed a deep learning ensemble of Single Shot Detector (SSD) models for ITC detection and delineation with a voting strategy for the species classification. We chose three study sites with different landscape patterns and we employed high resolution airborne imagery and elevation data as input products to the models. The results show that designing ensemble models has greater success than any single model, regardless of the local landscape pattern or image resolution. The detection performance and the accuracy rates were improved by 3 - 18% with only as few as two participant single models. Moreover, the results of voting strategies for species classification showed that they can be used to design the ensemble model in order to better accomplish the detection objective.

Keywords: ITC, deep learning, ensemble model, landscape pattern

9. Author(s): Mihai Stupariu [1]**, Alexander Klippel** [2]**, Nora Fagerholm** [3]**, Alin Plesoianu** [1]**, Ileana Stupariu**[1]**, Christine Fürst** [4]
[1] *University of Bucharest, Romania*
[2] *Pennsylvania State University, USA*
[3] *University of Turku, Finland*
[4] Martin-Luther-University, Germany

Title: *Novel technologies in landscape analysis: from a deeper understanding of patterns to an increased involvement of practitioners* (oral presentation)

Abstract:

Novel technologies became ubiquitous in our everyday lives. The technological advance contributes not only to the improvement of daily activities, but it also supports the whole workflow of scientific discoveries. One of the topics that have experienced rapid development in recent years is artificial intelligence, and we aimed to investigate to what extent the related techniques became useful to landscape ecologists. We searched the Web of Science databases by using two groups of keywords. The first group was related to landscape ecology and included keywords such as 'landscape pattern', 'land-use', etc. The second group was linked to artificial intelligence and to

the various related techniques such as machine learning, deep learning, (un)supervised learning. In the talk we present quantitative analyses related to the papers, we seek the most common methodologies, and we discuss the main themes covered by the studies. Thus, a common theme is related to land-use/land-cover, in relationship to the improvement of classification or to the changes that occurred over time. Recent approaches broaden the horizon and explore the opportunity to consider entire patterns instead of single pixels. Other studies bring into attention the transfer to ecological processes, such as those related to the species occurrence or movement. Beyond the advantages of novel technologies, several studies emphasize the need to find a suitable trade-off between automated techniques and human involvement. From this perspective, the combination with expert-knowledge could strengthen the use of novel technologies in landscape ecology studies.

Keywords: artificial intelligence, landscape pattern, classification

10. Author(s): Elena I. Parfenova[1], Nadezhda M. Tchebakova[1]
[1] Forest Institute of FRC KSC SB RAS, Russia

Title: *Bioclimatic modeling of human population density of Russia* (poster presentation)

Abstract: An important feature of Russia is the low and uneven population density distribution over Russia. This phenomenon is primarily and largely caused by climate conditions and area size. The goals of this study were to quantify the dependence of the population density on climatic factors over a territory. A paired GIS-analysis of the population density layer (a dependent variable) on climatic layers of warmth and water resources (independent variables) and climate severity over a territory was carried out. A significant linear regression was obtained that explained 32% the population density variation by climatic factors. To identify tendencies of the population density redistribution in a warming climate by the end of the current century we applied the obtained regression to the sharp climate change scenario RCP 8.5 (Representative Concentration Pathways 8.5). Over most Russia, the potential population density would increase on average; would remain low in permafrost regions and would decrease in fragments at the southern border by the end of the century. However, sources of the population increase in the Russian Federation remain controversial. Using their regularities, demographers predict the population size to decrease down to 90-120 mln people by the middle of the current century and see the way to replenish labor resources in the replacement migration.

Keywords: human population density, climate change, climatic migration, bioclimatic models

11. Author: Athanasios-Alexandru Gavrilidis[1]
[1] University of Bucharest, Romania

Title: *The influence of morphological and structural landscape features on metropolitan connectivity* (poster presentation)

Abstract: Natural landscape is the main support of human activities and their settlements. Flourishing cities across the world have developed in landscapes that were permissive in terms of built up expansion and abundant in terms of resources, ultimately converting them into urban and urbanized areas. However, the main natural feature of the landscape has influenced the design of these settlements. Metropolitan governance of urban and urbanized areas aims in ensuring an

efficient and sustainable development of the cities and their surroundings. Since 2004, some major cities in Romania have established metropolitan zones, while other are still in the process. Connectivity is one of the main assets of a metropolitan zones and its efficiency, thus landscape's natural features play a significant role in the design of the transport infrastructure. While all metropolitan zones where delimited based on economic and politic aspects, the landscapes morphological and structural aspects were neglected. In this study we aimed to establish whether local landscape features restricted the development and design of the metropolitan infrastructure network and to what extent. Using a proposed set of connectivity indexes, considering infrastructure type, sustainability, distances, and travel times, along with landscape aspects such as land uses, conservation status or landform fragmentation we were able to determine how well the metropolitan communities were interconnected. Using 9 metropolitan zones as case studies, the results have revealed that there are cases in which several communities within metropolitan zones are still remoted and have a poor connection with the polarizing city. The results have also showed if the landscapes morphological and structural characteristics played any part on this issue.

Keywords: Urban areas, Landscape features, Connectivity indexes, Transportation infrastructure, Romania

Section 3. *Global pressures / land-use change, landscape resilience*

1. Author(s): Davide Longato[1], Davide Geneletti[1]
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Title: *Identifying spatial and planning opportunities for Nature-based solutions in the area of Valletta, Malta* (oral presentation)

Abstract: Future challenges of urban areas (e.g., climate mitigation and adaptation, air pollution, etc.) have been shown to be promisingly alleviated by Nature-based solutions (NBS). NBS are actions that utilize ecosystem processes of green-blue infrastructure to safeguard or enhance the delivery of Ecosystem services (ES). The analysis of the opportunities for NBS implementation is a crucial step to identify where they can be implemented on the ground. This research presents an approach to identify spatial and planning opportunities for NBS implementation at the city scale. Spatial opportunities refer to the available undeveloped land within the urban fabric. Planning opportunities refer to the current spatial policies that explicitly advocates or provide directions for NBS implementation. The case study is represented by the urban area around Valletta, in Malta, one of the EU countries with the highest percentage of built-up areas and population density. Spatial opportunities are detected by identifying available open spaces within the urban development boundaries through GIS analysis of existing land use data. Planning opportunities are detected by analysing the land use policy instruments covering the study area, the so-called

North Harbour and Grand Harbour Local Plan. The analysis aims to identify what are the current policies involving specific areas (e.g., in vacant building lands, public spaces, etc.) and sites (e.g., in a specific street, square, etc.) that refer to: i) explicit NBS features; and ii) urban challenges may be addressed by NBS with appropriate ES supply. Spatial and planning opportunities are then assessed together to identify what city areas can benefit from NBS implementation and what not because of the lack of space/opportunities. NBS development in such areas is finally discussed considering possible planning actions and tools to achieve their implementation.

Keywords: Ecosystem services, Green-blue infrastructure, Urban challenges, Land-use planning, Spatial policies

2. Author(s): Nana Phirosmanashvili[1], Tekla Nadiradze[1], Mariam Goginashvili[1]
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Title: *Landscape Ecology and Climate Change impact* (oral presentation)

Abstract: The Farmers, Ag Cooperatives, Smallholders must be ready for adaptation and mitigation Climate change and environmental degradation processes affecting all types of Agricultural activities, including Aquafarming, Crop Farming, Beekeeping in all countries. Very important the development of National Policies and Strategies (with efficient Action Plans) on minimization of negative impact of Climate Change processes are serious about contributing to the reduction of poverty in the rural and urban communities in which they work, they must give consideration to the climatic and environmental hazards, which impact in Agriculture, Soils Degradation and weather constraints. Climate change and environmental degradation are proceeding rapidly and are already affecting many communities in developing countries like Georgia, where Farmers are facing the negative impact of Climate Change and environmental degradation caused by Greenhouse gases. It is increasingly acknowledged in the adaptation to climate change guideline's that factors to be minimized. Such National Policies must explore adaptation strategies by focusing on livelihood diversification in the face of the most recent problems that are indicated by Farmers during observation last decades and it is shown as a major barrier to adopt these impacts without knowledge and capacity building. Global land use is responsible for almost 25% of greenhouse gases. The main culprit here is agriculture, but forestry and the deforestation of land for other purposes also make a significant contribution. Soils and vegetation, however, also absorb almost 30% of human-made greenhouse gas emissions. The reduction of greenhouse gases from agriculture must be focused on the adaptation technologies, so-called green technologies in Agricultural sectors to the consequences of climate change.

Keywords: Climate Change, Landscape Ecology

3. Author: Carolina G. Ojeda[1]
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Title: *The possible landscapes for the southern cone of Latin America: landscapes in suspended animation, corporate landscapes, and landscapes of disaster* (oral presentation)

Abstract: In recent decades, academic production on the landscape has increased, however, it has developed unevenly, favoring Eurocentric theories, subordinating the study of cases for Latin America and disciplinary typecasting. Based on a review of concepts of cultural-perceptual geography, anthropology, political ecology, and historiography, three types of landscapes are described that will shape part of the future of the southern cone of Latin America: 1) The landscapes in animation Suspended are characterized by the slow transformations in their components in rural or peri-urban contexts. 2) Corporate landscapes specifically alter the aesthetic - functional characteristics of the landscape driven by monocultures and extractivism, losing their identity and degrading their soils. 3) Disaster landscapes are those where anthropogenic impacts lead to greater exposure to the disturbances of socio-natural disasters.

Keywords: landscape, landscape, Latinamerica, ruralization, natural disasters

4. Author(s): Oluwatobi Emmanuel Olaniyi[1], Omowale Hakeem Olalekan[1]
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Title: *Evidences of habitat fragmentation and restoration due to conservation in Old Oyo National Park, Southwest Nigeria: A landscape analysis approach* (oral presentation)

Abstract: The quantification of habitat fragmentation and restoration of protected areas over a period is essential for the monitoring and assessment of any ecological intervention. This study aimed at detecting the landscape pattern, dynamics and intensity of fragmentation due to conservation within the last four decades in Old Oyo National Park (OONP), Oyo State, Nigeria. Field observations, remote sensing and geographic information technology were employed. Three-time series (1986, 2003 and 2019) of Landsat satellite imageries were acquired and subjected to supervised image classification. Four land use and land cover (LULC) classes were identified. The results revealed that the mixed open savanna areas (MOSA) covered the highest landmass (1034.40km2, 41.19%) of the whole area in 2019, while riparian grassland and fringing woodland/water body occupied the least landmass (275.90km2, 10.99%). However, there was a drastic transition of the predominant LULC (MOSA) from 1986 to 2003 (-144.69km2, -5.76%), and from 2003 to 2019 (-220.59 km2, -8.78%), mostly accounted by a change of MOSA to outcrop vegetation and dense woodland and forest outlier respectively. The landscape analysis revealed an increase in the landscape fragmentation based on the increase in the number of patches and a decrease in mean patch area of the LULC classes. The drivers of the LULC and landscape dynamics could be some technological, natural and cultural forces. Despite the natural restoration

due to conservation, the evidence of habitat fragmentation calls for concern in the introduction of mitigating measures to avoid serious environmental degradation.

5. Author(s): Victoria Espinoza-Mendoza[1,2]**, Gustavo A. Zuleta** [1,2]
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Title: *Land Use Transitions and historical analyses in a socio-ecological landscape, Mesopotamia, Argentina* (oral presentation)

Abstract: Land Use Change (LUC) is determined by factors associated with a range of social, economic, political, cultural, and environmental drivers and a variety of spatial and temporal scales. Has been associated with human activities for centuries. However, current trends show an intensive land-use with regionally diverging patterns of Land Use Transitions (LUT). Thereby, understanding LUT is key to assess the historical changes in the landscape by reconstructing their land cover history. The Mesopotamia region is a mixed landscape covering around 20Mha including a significant eco-regional gradient of template grasslands, subtropical forests, wetlands, and dry forests. Different events during the pre-colonial, colonial, and post-colonial have resulted in a conversion of lands such as native forests and grasslands, intensified land degradation and contributing to the current patterns. In this study, we aim to understand the state of LUT in Mesopotamia region based on historical land uses. Over recent decades major LUT have aggravated the degradation, being Espinal and Pastizal Pampeano the most disturbed ecoregions (around 70%), especially due to the expansion of monocultures and exotic tree plantation areas. Which are motivated by public policies, eco-demanding customers, and a strong cross-sectorial interaction. Finally, we found that: (1) Mayor LUC occurred between XVIII – XIX century, consequently currently exist an intensification of land use on areas previously converted to other uses, (2) exists a displacement in land demand among regional and global level, (3) Pastizal Pampeano and Espinal ecoregions, follows the Pampean economic model ("Pampeanizacion" Spanish acronym, in reference to the most populated and developed ecoregion of Argentina), (4) Campos and Malezales, Selva Paranaense and Delta of Parana ecoregions, are characterized by a replacement of native ecosystems under livestock/agriculture to exotic forestry and (5) LUT and historical analyzes can predict landscape changes in Mesopotamia region.

6. Author(s): Taisser H. H. Deafalla[1]
[1] *TU Dresden, Germany*

Title: *Analysis of the Effects of Agricultural Land Use Change in Conflict Areas, Case of Nuba Mountains Region* (oral presentation)

Abstract: The changes caused by human-induced impact on atmospheric composition, climate, land, water, and biodiversity are occurring so rapidly that the natural systems are increasingly losing their adaptive capacity. The resulting degradation of the planet's resources and life-support systems may be irreversible at scales relevant to present human society. The study aimed identify to agricultural systems and their effect on land cover in Nuba Mountains region of Sudan. Where, the study area suffering to loss of arable land due to war, desertification, and soil erosion, which endangers both pastoralists and rural peoples. Rapid rural appraisal, with focus on group discussion, informal meetings, free listing, key informants techniques and social survey with sample size of 224 for both displaced and non-displaced respondents were applied. The qualitative and quantitative techniques were used to analyze the socio-economic data. Subsequently, Hotspot analysis was conducted to detect the affected areas by deforestation. Different types of agricultural systems were found in study site. On the Other hand, the study detected high rate of deforestation in the area depending on the many factors such as: availability of the land, the amount of rainfall, topography of the area and registration of the land. Indeed, deforestation is a particular concern in Nuba Mountains because the loss of biodiversity is damaging the potential for economic growth, as well as affecting the safety of those inhabitants in terms of food and health (medicinal plants) and limiting their options of survival. To enhance any development strategy, forest authorities should actively involve local inhabitants and to support these through helping them understand the perceptions, aspirations as well as to give due consideration to their basic needs and integrate indigenous knowledge when developing land management strategies and plans.

Keywords: Agricultural systems, Land degradation, Conflict, Deforestation, Hotspot analysis

7. Author(s): Ancuta Fedorca[1]**, Ramon Jurj**[1]**, Mihai Fedorca**[1]**, Georgeta Ionescu**[1]**, Marius Popa**[1]
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Title: *Effect of changes due to roads and railways on wildlife connectivity in Southern-Eastern Romanian Carpathians* (oral presentation)

Abstract: We have used a novel methodology for building a model-based estimation of the collision risk in four areas selected on the most crowded national roads in the Southern-Eastern Romanian Carpathians and, for the first time, we report on collision risks aiming to contribute to road safety for both human and wildlife. While traffic on existing infrastructure is much higher than the recommended levels proposed as critical for considering roads as an effective barrier (above 10000 vehicles per day), wildlife is still managing to cross, especially due to road permeability. The number of hot-spots for collision risk varied from four (Sacele – Maneciu) to ten (Bogatii Valley) and, moreover three hot-spots were registering cumulative effects of road, railway and river (Prahova Valley case study). Overall, roads were permeable for wildlife species in the high-speed sectors and this facilitated successful crossings. Moreover, risks zones were situated in the/next to ecological corridors for brown bear, lynx and wolf, confirmed by the road

mortalities in these zones. While a small number of roadside wildlife warnings have been identified in the study area, our results will be transferred to road administrators and other decision-makers in order to identify places were wildlife warning signs are needed to ensure traffic safety.

Keywords: collisions risk, crossing, connectivity, traffic safety

8. Author(s): **Ioan-Cristian Iojă**[1], **Gabriela Osaci-Costache**[1], **Jurgen Breuste**[2], **Constantina-Alina Hossu**[1], **Simona Raluca Grădinaru**[1], **Diana-Andreea Onose**[1], **Mihai-Razvan Niță**[1]

[1] *University of Bucharest, Romania*
[2] *Paris-Lodron-University Salzburg, Salzburg, Austria*

Title: *Patterns of urban blue infrastructure changes along the city limits – Bucharest case study* (oral presentation)

Abstract Urban blue infrastructure represents almost 3% of Romanian cities. Their distribution, structure and connection with urban matrix have a high impact in achieving the sustainability and resilience goals. The present study aims to test the specific changes that urban blue infrastructure have experienced in the past along the city limits. Based on the information extracted from historical maps over the past 160 years (1856–2016), we performed a land-use change analysis of Bucharest city, Romania. A comparative analysis between the core area and the hinterland are performed, considering relevant indicators for the urban blue infrastructure. Our results show that the Bucharest system of urban waters has significantly changed from small and disconnected patches to large and better-connected areas. The core areas experiment a significant change of urban blue infrastructure in terms of surfaces, structure, connectivity, and relations with urban components. Otherwise, in the hinterland areas, the urban blue infrastructure has known an expansion oriented through the maintaining of ecosystem services that were lost in the core areas. The results point out the areas where urban expansion has destroyed the structure and functionality of urban blue infrastructure components. These data are useful for increase the resilience and sustainability of urban areas through ecological restoration projects, nature-based solutions or engineering approaches.

Keywords: urban blue infrastructure, land use changes

9. Author(s): Alexandru-Ionuţ Petrişor[1], **Lidia Mierzejewska**[2], **Andrei Mitrea**[2], **Krzysztof Drachal**[2]

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[2] *Institute of Socio-Economic Geography and Spatial Management, Faculty of Geographical and Geological Sciences, Adam Mickiewicz University in Poznań, Poznan, Poland*

Title: *Planning insights for the urban landscape: a perspective based on the dynamic of the green infrastructure in Romanian and Polish cities during 2006-2018* (oral presentation)

Abstract: Studying the urban green infrastructure is important because of its ecosystem services, contributing to the welfare and comfort of citizens, and sustainability. Planning can increase or diminish their level. Despite numerous studies on the green infrastructure - ecosystem services - planning nexus, very few concrete planning recommendations were phrased. This study aims to

provide recommendations for a broader audience by analyzing the dynamic of the green infrastructure in Polish and Romanian cities in connection with its drivers. A novel approach including mathematical modeling and geostatistical analyses was applied to Urban Atlas and statistical yearbooks data. The results indicate that the green infrastructure was lost and fragmented in all Romanian and Polish cities during 2006-2012. The drivers include urban built-up area, population and density, number of building permits, number of new dwellings completed, number of employees, and total length of roads. The study also revealed a tremendous lack of consistent data across countries using the same statistical indicators. Based on the findings, planners should aim for preserving and developing the green infrastructure and its continuity, city managers should use more research in decision making, policy developers should develop targeted policies, and scientists should develop manuals for the planners and city managers.

Keywords: urban dynamic, post-socialist countries, city nature, urban sprawl, derogatory planning

10. Author(s): Olimpia Copacenaru[1], Cristian Flueraru[1]
[1] *University of Bucharest, Faculty of Geography, 'Simion Mehedinți – Nature and Sustainable Development' Doctoral School*

Title: *Land Reforms and Their Impact on Agricultural Landscape Dynamics in Romania. Earth Observation-Based Multi-Scale Approach* (oral presentation)

Abstract: Land fragmentation, the scattered structure of agricultural areas, is a significant point in the current global economic setting, given the population growth and the increasing need for both sustainable cultivating practices and high agricultural yields. Several events in Romania's history still make great influence on the current agricultural development and are especially linked to the land fragmentation/land consolidation processes. Between 1947 and 1962, the collectivization of Romanian agricultural lands caused individual farmers to lose their rights to cultivation and land ownership, leading to the creation of a system of large industrialized farms. Then, following the collapse of the Romanian communist regime in 1989, the country switched to a capitalist system, with the imminent land restitution leading to excessive fragmentation. The objective of this paper is to perform a complex reconstruction of the dynamics of land fragmentation/land consolidation in Romania, based on a relevant series of samples, designed according to the rural landscape particularities, and paying a special attention to the timeline of political events that triggered the specific evolution. The change detection analysis proposed was performed based on multi-resolution Earth Observation data (medium and high-resolution satellite imagery), covering the period between 1990 and 2020. Several indices, relying mainly on the geometrical properties of land parcels, have been computed and their relevance has been tested in different environments, in order to deliver a universal approach and an extensive image of agricultural landscape dynamics at different scales, from local to national. The analysis integrates a series of additional socio-economic statistical indicators, expressed at local-scale level, that were considered to drive or be driven by land fragmentation. The developed approach integrates multiple relevant data categories coming from open sources and provides a workflow that can be re-run at any time for another area of interest, or at a future moment in time, with newer datasets.

11. Author(s): Simona R. Grădinaru[1], Cristian I. Iojă[1], Mihai Răzvan Niţă[1]
[1] *University of Bucharest, Romania*

Title*: Impact of national policy sequencing on patterns of development. Insights from Romania*. (oral presentation)

Abstract: Globally, built-up development is taking place at unprecedented rates, with large implications for the dynamic of urban and peri-urban landscapes. To mitigate and limit its effects, recent scientific and spatial planning communities call for built-up management to be addressed on broader scales, from regional to national, and coordinated with multiple policy domains. Despite the variety of studies studying policy effects, few focus on the sequencing of policies over long periods of times or the interplay among policies in multiple domains. With this study, we aim to fullfill this gap and assess the impact of national level policy sequencing in Romania on urban development, over the entire period from the fall of the communist regime to present. We focus on multiple domains with potential to impact development patterns. Policy content analysis, land use change assessment and policy visualizations and heatmaps are employed as research methods. Findings reveal that major political and economic events affect the way policies address the expansion of built areas. Over time, policies shifted from encouraging growth in large cities to managing local patterns of expansion. Strongest impact on development came from policies in the domains of transportation, regional development, public administration and the environment. This shows that for guiding development towards desired trends and patterns, countries should consider stronger coordination between built land changes and sectoral policies. Lack or poor policy coordination could have unwanted effects, such as fragmentation of agricultural landscapes, or could limit the use of the planning instruments in decision making.

12. Author(s): Mihai Mustăţea[1], Ileana Stupariu[2]
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[2] *Department of Regional Geography and Environment, Faculty of Geography, University of Bucharest, Romania*

Title*: Using stakeholder perspective and landscape change analysis in order to identify potential triggering factors of human-wildlife interactions*. (oral presentation)

Abstract: Human-wildlife interactions (WLI) are frequent in the post socialist period in central European countries mountains areas were natural ecosystems and primary forest habitats were

converted into artificial land cover classes due to uncontrolled expansion of touristic infrastructures, such as the case of the upper Prahova valley from Romania.

In our study we hypothesize that the increasing number of WLI after 1990 could be a potential consequence of forested landscapes loss or conversion into artificial land cover classes.

Therefore, the goal of our study is to analyze if there is a potential correlation between the WLI temporal manifestation and the landscape spatial dynamics within the upper Prahova valley of Romania.

The methodological steps of the study are: (i) applying 450 questionnaires to local stakeholders in order to collect data regarding WLI temporal occurrences; (ii) modelling the landscape spatial changes within of the study area between 1990 and 2018 for identifiyng areas with loss of natural land cover classes; (iii) overlapping the distribution of both households afected by WLI and areas with loss of natural ecosystems for assessing the presence of a spatial correlation between the two variables.

The local stakeholders indicate that in case of all the problematic species, such as brown bear, wild boar and red fox, the number of interactions with humans follow an ascendant trend between 1990 and 2018. The landscape change analyses reveals that between 1990 and 2018, the forest habitats were replaced by artificial land cover classes mainly at the outskirts of settlements.

By overlapping the landscape change models with the WLI spatial distribution, the maps indicate that the loss and conversion of forest habitats into artificial areas after 1990 could represent one of the major causes for the increasing number of WLI.

The results are usable for both forest ecosystems conservation in the region, wildlife management and human infrastructures durable spatial planning.

Keywords: *Human-wildlife interactions, landscape change, post-socialist period, upper Prahova valley.*

13.Author(s): Vagner Luis Camilotti, Patricia Pinho[1], Eduardo S. Brondizio[2], Maria Isabel Sobral Escada[3]

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[2] *Indiana University Bloomington, United States of America*

[3] *Brazilian National Institute for Space Research, Brazil*

Title*: Landscape, socioeconomic factors, and the importance of forest extractive resources for income generation and subsistence among ribeirinhos and colonists in the Brazilian Amazon* (poster presentation)

Abstract: Do riverine and colonist populations – showing different contexts of accessibility to potential markets, income generation, and landscape disturbance levels (LD) – attribute different importance values to forest extractive resources (ER: timber, fruits, hunting, medicinal plants,

and fishing) as a source of income and subsistence? We answered this question based on interviews with key informants in 89 settlements (57 riverine and 32 colonist settlements) in the Brazilian Amazon. We found that the importance attributed by colonist and riverine populations to the ER had some similarities that seem to be partially explained by the accessibility of the populations to the urban centers (both distance and type of access), their income and, in a lower degree, by the disturbance in the landscape. Thus, settlements exhibiting incomes lower than two minimum salary per month, located more distant from local urban centers and with access to them only by river attribute higher importance to the ER for both subsistence and income generation. The later importance can also be higher in settlements exhibiting landscapes with a medium LD (up to 50% of forest lost) and very possibly in those settlements located near regional urban centers.

Keywords: *landscape disturbance, timber and non-timber forest resources, NTFP, Amazon, sustainable livelihoods*

14. **Author(s): Nilca Mara Ioana**[1]
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Title: *Effects of land-use on soil erosion in the Carpathian and Subcarpathian Valley* (poster presentation)

Abstract: Soil erosion is a widespread form of soil degradation, and it has a considerable environmental and economic impact on different scales. Even though erosion is a process shaped by natural factors, current anthropogenic interventions within the landscapes often accelerate natural erosion rates staggeringly. The determination of soil loss predisposition within the Carpathian and Subcarpathian Prahova Valley is considered a significant theoretical and practical issue, the knowledge of it creating premises for better risk management and land-use planning. This paper aims to review the influence of land use on soil erosion potential.

Keywords: *soil erosion, land-use, land-cover, GIS*

15. **Author(s): Ana-Maria Calota**[1]
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Title: *Land-use conversion - projection on pastoral landscape* (poster presentation)

Abstract: Pastures in the proximity of urban settlements are facing constant pressures from the society due to constant expansion of human activities. Romania has a total pastures area around 3 mil. ha, animal husbandry being a traditional human activity. Due to the decrease of livestock and the presence of retail agents with cheaper imported products in the past decades, many pastures have been abandoned or converted to other land-cover classes leading to major and irreversibly landscape changes. The aim of our study is to quantify the effects of defective

planning on pastures using land use and land cover classes. The land use dynamics was analyzed at pasture scale using satellite images for each case study from three years: 2005, 2008 and 2018. Using the information extracted from the satellite images we generated land-use maps using ArcMap 10.3.1. The results have shown that the selected pastures for our case studies have shrinked their area in favor for the expansion of built-up areas, leading to loss of pastoral area, green mass production and irreversibly changed the landscape components and functions. These changes create dysfunctionality with consequences for the visual aspect of the landscape, the biodiversity of the pastures and the landscape pattern.

Keywords: *land-use changes, pastures*

16. Author(s): Diaz-Maroto, Ignacio J. [1]
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Title: ***Ecosystem services regarding to forest management in temperate oak forests*** (oral presentation)

Abstract: Temperate forests are in middle latitudes of both hemispheres. Two types of temperate broadleaf forests in these latitudes and outside the tropics are settled: the evergreen forests and the deciduous forests. In the current scenario of climate change, resilience of these areas it is favoring the expansion of the forest because of the gradual increase in temperature and precipitation maintenance; but with important nuances, a significant decrease in snow precipitation and shorter duration of the cold season. So, on the one hand, the oak trees are the main species of many of these forests, play an important role for biodiversity and people livelihoods, as well as to maintain ecosystem services. However, on the other hand, oak forests are under pressure from global warming, e.g., land-use change, fragmentation, pests and diseases, and progressive replacement by more shade tolerant tree species. Despite widespread human activity, still oak maturate forests can be found in different regions of Europe, Asia, and America. Significant transformations have occurred within the last 150 to 200 years as industrialized countries shifted from an economy based in the firewood and the charcoal to fossil fuels. And, further alterations are likely in the temperate zones, as changing policies for agriculture and nature conservation provide different incentives for land use shifts from agriculture to forest. Our research aims to evaluate the ecosystem services regarding forest management applied, both past and present, always looking for sustainable rural development. In this context, the sustainability of forest management depends mainly on the maintenance of traditional activities: extensive agropastoral exploitation and rational management of forests. To guarantee the sustainability of these activities, measures such as clear cutting and prescribed burning to create open habitats, improvement of forest access, increment of public awareness, and environmental actions need to be adopted.
Keywords: *Temperate forests, Climate change, Human activity, Sustainability*

Section 4. *Landscape governance as a socio-ecological practice: historicistic and international perspectives*

1.Author(s): Merekalova Ksenia Alekseevna[1], Matasov Viktor Mikhailovich[1], Andreeva Alexandra Pavlovna[1], Batalova Vlada Alekseevna[1], Donetskov Alexander Andreevich[1], Ilyinova Natalya Vladimirovna[1], Moiseev Alexander Igorevich[1], Podgorny Oleg Mikhailovich[1], Rudenko A.[1], Titov German Sergeevich[1], Shatunov A.[1]
[1] *Lomonosov Moscow State University, Russia*

Title: *Urban socio-ecological systems mapping and analysis: opportunities for urban space development* (oral presentation)

Abstract: Urban landscapes assessment from the perspective of the fulfilment of their regulating, supporting and cultural functions relies on the concept of ecosystem functions and services, but in application to a system of a higher order – urban socio-ecological systems (SES). We consider the regulation of natural processes in the city, creating opportunities for recreation, the emergence of a "sense of place" and an aesthetic perception of urban landscapes take place not only because of landcover type, but also by means of landforms properties, material and non-material human creations, as well as the urban environment spatial pattern or mosaic. For the city of Lipetsk (Russia) we draw the map of urban SESes and studied the effect of urban landscapes pattern on regulating (local climate, air quality and snow accumulation regulation) and cultural (recreational, aesthetic and territorial identity) landscape functions. The index-based classification of landcover helped us to determine the proportion of vegetation and sealed areas in each map contour. We calculated land surface temperatures based on Landsat 8 TIRS data for different seasons of the year and linked them to urban landscapes composition. For assessing air pollution in the city we collected snow samples from undisturbed surfaces at about 170 sites across the city and determined the total dust pollution per 1 sq.m. and pH of snow. Based on the analysis of residents' surveys a generalized rating of the city's recreational spaces was compiled. We also used expert estimates and density of citizens' photographs to identify the most and less attractive territories of Lipetsk. To determine the mental frame of the territory we analyzed mental maps and questionnaires and obtained maps of the most significant areas, streets and objects. Assessment of different functions of urban SESes revealed the problems of city areas and proposed suitable solutions for the development of urban space.

2.Author(s): **Alexandru-Ionuţ Petrişor[1], Walid Hamma[2], Huuduy Nguyen[3], Mari-Isabella Stan[4], Van Truong Tran[5], Roxana Aştefănoaiei[6], Quang-Thanh Bui[7], Dragoş-Florian Vintilă[4], Cristina Lixăndroiu[6], Diana-Doina Ţenea[4], Igor Sirodoev[4], Ioan Ianoş[8]**
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Title: *Sustainable planning for the coastline landscapes: a global perspective*(oral presentation)

Abstract: The importance of studying the coastal areas is justified by the fact that their resources, the ecosystem services provided and key role played in the socio-economic development of human communities, have attracted people from the ancient times until today. The human pressure resulted into severe environmental impacts, requiring in-depth analyses for phrasing sustainable development strategies. The present study addresses this issue globally, based on three case studies from three continents: Romania (Europe), Algeria (Africa), and Vietnam (Asia). Although each study employed different approaches, the methodology consisted of correlating geospatial and socio-economic data, including ancillary studies, to look at the urbanization of the coastal areas, its impact, and solutions for mitigating the latter. The findings show that the pressure of urbanization and tourism on the coastal areas has increased globally, although the drivers and impacts vary. The urbanization is due to derogatory planning in Romania and Algeria, and different national and local goals in Vietnam. The two drivers translate into local exemptions from the national regulations, made for a rapid profit. In addition to the need for developing and enforcing coherent policies for stopping the degradation and restoring the ecosystems, the findings underline the importance of international cooperation in policy development.

3. Author(s) Gabriela Osaci-Costache[1], Ionuț Săvulescu[1], Marian Ene[1], Marina Vîrghileanu[1], Octavian Cocoș[1]
[1] *University of Bucharest, Romania*

Title: *Between traditional land use and land degradation: more than two hundred years of history in the Sub-Carpathian Watershed of the Argesel River (Romania)* (oral presentation)

Abstract: The Sub-Carpathian river basin of the Argesel is one of the areas where internal and external factors generate conditions for the manifestation of slope processes. Here, the predominance of marls, the morphometric characteristics and the land use determine a fragile geomorphological balance and a high incidence of landslides. Consequently, this area requires special care, so that the economic value of the land be preserved.

Our objective is to identify the changes in land use that lead to the local reactivation of landslides, which are geomorphological processes with negative effects, especially on roads and buildings, as well as to the alteration of the production capacity of agricultural land. The study is based both on large-scale historical maps from the period 1790-1980 and on multispectral satellite imagery of medium to high spatial resolution, such as Landsat (30 m) and Sentinel-2 (10 m), covering the last decades. The paper analyzes through GIS techniques the historical transition (over more than 230 years) from a traditional pastoral use (in the eighteenth and nineteenth centuries the pastures accounted for about 80% of the area), to the orchards imposed by the communist regime (which amounted to 40% in 1980) and to the current degraded orchards, some of them showing a transition to bushes. In the twentieth century, the areas covered by forest did not suffer significant changes, thus remaining at about 15% of the area. The results suggest that orchard degradation caused by the socio-economic changes occurring after the 1989 revolution (aging population, emigration of young labor force, change of ownership, etc.), coupled with the physico-geographical conditions, the inadequate response of local farmers and the lack of land use policies, have led to landscape degradation and severe road damage.

Keywords: *land use change, historical map, diachronic analysis, land degradation, landscape*

4. Author(s): Cristina-Gabriela Mitincu[1], Ioan-Cristian Iojă[1], Constantina-Alina, Hossu[1];
[1] *Centre for Environmental Research and Impact Studies, University of Bucharest, Romania*

Title: *Management of stakeholders in environmental planning documents*. (oral presentation)

Abstract: Urban planning in Romania was challenged with a large number of issues as a result of the socio-economic and cultural changes which followed the shift on the political stage (mostly by the European Union entrance in 2007, when the directives and regulations have been implemented into the national legislation imposing new standards for urban areas quality), which affect the structure and functionality of the cities. Our research objective is to identify the stakeholders involved and their importance in the decision-making concerning the environmental planning process. Regarding this, in the present study, we analyzed 40 Local Environmental Action Plans (LEAPs) from Romania, in order to highlight the stakeholders involved in urban development and management, including design, funding, implementation and monitoring. Thus, we classified the stakeholders into five categories as follow: (a) public institutions, (b) research and educational organizations (d) private investors, (e) non-governmental organizations and (f) population. Further, we used the network analysis method in order to identify the most involved and influential stakeholders from each category and the relationship between them (vertical and horizontal coordination, hierarchical organization etc.). Our main results identified that the stakeholders represented by the public institutions (public administration authorities like sectoral and general councils, sectoral and general town halls etc.) are the most involved in the urban planning process. Moreover, we need to highlight that the public involvement was low, mainly of the population and non-governmental organizations. In conclusion, our study tries to better understand the organization of urban planning stakeholders and coordination of different sectors in order to establish planning targets and opportunities.

Keywords: *Environmental planning, Environmental management, Romania, Stakeholder analysis*

5.Author(s): Mihai-Răzvan Niţă[1], Athanasios-Alexandru Gavrilidis[1], Diana-Andreea Onose[1]
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Title: *Assessing the role of urban landscapes for healthy cities* (poster presentation)

Abstract: Faced with numerous environmental (air quality, extreme events), economic (loss of capital) and social (inequity, poverty) challenges, modern cities have tried to re-direct themselves towards sustainability, resilience, improved health and well-being. Urban inhabitants are facing unprecedented health challenges (obesity, cardiovascular or respiratory diseases, stress and mental illness) which have as clear determinants the structural and functional characteristics of the cities. Especially for the mental part, urban landscapes play a pivotal role in shaping the health of inhabitants. We realized a literature review of papers published in peer-review journals and indexed in the WoS database, which analyze the relation between urban characteristics and the health and well-being of inhabitants. Using a standard coding procedure, we extracted information characterizing the health determinants of urban landscapes, their relevance, positive, neutral or negative roles, as well as issues of scale, urban functions of demographics of the population. Preliminary results allowed us to create an integrated framework of assessment for the role of urban landscapes in determining healthy cities, useful instrument for urban planners and policy makers.

Keywords: *urban landscape, literature review, health determinants*

6.Author(s): **Gabriela Osaci-Costache[1], Iuliana Armaş[1]**

[1]*University of Bucharest, Romania*

Title: *A green-blue corridor in a green city: Bucharest's Dâmbovita in 1846* (poster presentation)

Abstract: Throughout history, man-made inferences have completely altered the river landscape of the Dâmboviţa within the city of Bucharest. It is almost impossible to imagine today a Dâmbovita riverbed of the past centuries, which meandered softly among houses, gardens, courtyards, meadows, and forests, which provided drinking water and supported fishing activities, to which the tans, water mills, and the sewerage of the city were linked. In order to remodel the natural Dâmboviţa riverbed of the mid-19th century and the urban floodplain land use as precisely as possible, we used the Borroczyn plan (1846, scale 1:1000), which reproduces the city within the administrative limits of that time (approx. 29 kmp, of which the meadow represents about 35%). For this propose, we applied GIS techniques and the extracted quantitative and qualitative data were related to other written sources from that period. The cartographic analyze shows that the development of the built-up areas and the successively structural interventions along the river

annihilated the green corridor of the Dâmbovita, where in the mid-19th century the green space covered 62% of the floodplain.

7.Author(s) Alina Huzui-Stoiculescu[1], Georgiana Toth[2], Alexandru-Ioan Toth[3], Robert Stoiculescu[4]
[1]*Ministry of Public Works, Development and Administration, Romania*
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[3] *Sociometrics, Romania*
[4] *University of Bucharest, Romania*

Title: *Exploring determinants of environmental behavior. A social-ecological approach to nature conservation policies in the Villages of Southern Transylvania* (poster presentation)

Abstract: As a consequence of the transition towards market economy and Romania's accession to the EU, socio-economic changes have pushed households into assuming new livelihood strategies, thus seeking to integrate the existing capital and opportunities offered by local, regional and international markets. Rural communities are turning to migration as a household strategy besides intensifying the agricultural use or increasing non-agricultural activities in order to create well-being through the use of accessible physical, natural, financial, human and social capitals. Both spatial mobility strategies and those addressing on-site activities quest the same results – well-being and poverty alleviation – hence the analysis can't dissociate migration consequences from the results obtained by communities through the combination of other activities. This paper explores the particular context of rural communities from Southern Transylvania which is a high nature value farmland area. It's overall included in the Nature 2000 network and largely preserves a traditional agricultural model. It represents a socio-ecologic system marked by several complex linkages, given that biodiversity is influenced by traditional farming while communities still benefit of local ecosystem services. Recent socio-demographic changes (depopulation, demographic aging, or changes in ethnic structure) open the debate on how EU's biodiversity conservation and rural development measures can be used in preserving traditional agro-ecologic systems. The main research question that this paper intends to answer is 'How are landscape conversation policies like agri-environment schemes influencing livelihood strategies and social structure of rural communities living in high nature value farmland?' Our results are based on

quantitative and qualitative analyses of data collected from several communities located in Southern Transylvania.

Keywords: *high nature value farmland, household livelihood strategies*

Section 5 . Ecological wisdom for sustainable landscape governance: exemplary cases from around the world

1 Author(s) Khoroshev Alexander-Vladimirovich [1]
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Title: *Context-based spatial decisions in landscape-ecological planning* (oral presentation)

Abstract: We advocate the geosystem approach to landscape-ecological planning which deals with the properties and the internal energy, water and matter turnovers of landscape systems and uses biophysical units as a base for distributing land use types in space. Recent publications in landscape planning as well as presentations at the conferences more and more focus on participatory approach and communication process which is extremely important under the conditions of dominance of lands in private property. However, the principal aim of landscape-ecological planning is to adapt land use to natural units and to imitate natural flows and processes as perfectly as possible. The main principle of the context-based landscape planning is the due consideration for both intrinsic properties of a unit and its value in a broad (regional, national or international) spatial context. Multifaceted view on landscape context makes us to distinguish at least four approaches to evaluation of ecological functions. First, the value of a landscape unit can be related to powerful influence that it exerts on neighbouring or distant units. Second, a landscape unit can have its own value independent on a context (e.g., habitats of rare species). Third, a landscape unit can have no any special own value but can be an important regulator of relations between neighbouring units. Fourth, the value of a landscape unit can emerge temporarily if anthropogenic or natural processes strongly reduce the values of neighbouring units. We demonstrate the framework for implementation of these issues into landscape-ecological planning based on case studies in the taiga zone of Russia in the course of realizing RFBR project 20-05-00447 and State target for Lomonosov Moscow State University "Structure, functioning and

evolution of natural and natural-anthropogenic geosystems" (project No. AAAA-A16-116032810081-9.

2.Author(s) Alvarez-Alvarez Pedro[1], Perez-Giron José Carlos[1], Diaz-Varela Emilio Rafael[2]
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[2] Department of Plant Production and Project Engineering, School of Engineering, University of Santiago de Compostela, E-27002 Lugo, Spain.

Title: *The importance of the understanding of local governance structures for the recovery of chestnut orchards in mountain landscapes: Case studies in Galicia* (NW Spain). (oral presentation)

Abstract: Chestnut (Castanea sativa Mill.) is a native species to the NW of the Iberian Peninsula, where it has been cultivated in orchards from centuries, representing one of the most important elements of the cultural landscapes in the area. From the Middle Ages to almost the mid of the nineteenth century, chestnut orchards had a been an essential element in the social-ecological system, and as such are reflected in numerous elements of the traditional knowledge, toponymy, literature, and art. Nevertheless, in the last decades of the 20th century chestnut orchards have suffered a strong process of abandonment and degradation due to new driving forces in the rural areas. As a consequence, the system has been affected by a decline in the supply of ecosystem services, including the provision of fruit, wood and timber, climatic regulation, as well as the loss of important valuable varietal genetic materials and important cultural and heritage assets. While all these changes contributed to modify the structure of the social-ecological system, chestnut orchards still present a high potential for the development of multifunctional, sustainable landscapes. One of the essential elements for the recovery of the cultural and natural heritage of chestnut orchards as well as their productive capacity is the understanding of the origin and evolution of the different ownership regimes, property rights and management approaches. Often neglected, these aspects nevertheless had in the past and still have a crucial role in local governance structures. In this paper we approach the recovery of chestnut orchards in mountain areas the region of Galicia (NW Spain) from a socio-ecological perspective, analysing their past, current and future features from different cultural, functional, management and governance perspectives.

3.Author(s): Davide Geneletti[1], Chiara Cortinovis[2]
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[2] *CEC - Lund University*

Title: *Planning nature-based solutions in urban vacant lots* (oral presentation)

Abstract: An emerging problem in some cities, in Europe but also elsewhere, is the presence of land parcels with building rights that are not developed, due to the on-going crisis of the building sector, or other economic reasons. Irrespective of their conditions, and the market situation, these vacant lots often maintain their development rights through time, because revoking them can be legislative (or politically) challenging. As a result, these areas are left idle for long periods of time, and are often abandoned and unkempt. Nature-based solutions (NbS) can offer a way out of this problem, provided that their implementation can prove to be flexible and reversible (e.g. to accommodate future shifts in housing market), cost-effective, and beneficial to people (communities, administrators, land owners) and nature. In this study we empirically analysed the potential impacts of implementing a range of different NbS in the vacant lots of a city in northern Italy, by assessing the expected ecosystem services for different groups of beneficiaries, and the cost for executing and maintaining NbS over different time horizons (5, 10, 20+ years). To this purpose, we considered five broad categories of NbS (rain gardens, Kyoto forests, recreational areas, allotment gardens, habitat for wildlife), and simulate their implementation in the lots that are currently vacant, despite having development rights. Potential NbS were allocated to the different lots according to the suitability of the site (e.g., by looking at morphology, size, etc) and the demand for that "solution" (e.g., by considering population density and classes, proximity to existing parks or allotment gardens, imperviousness rate, etc.). The resulting scenarios of future implementation of NbS were assessed against the expected costs (including taxation associated to development rights), and used to draw conclusions about the overall role that NbS can play for revitalising vacant lots in cities.

4.Author(s) Ancuța Fedorca[1], Aaron Laur[2], Ramon Jurj[1], Marius Popa[1], Mihai Fedorca[1], Georgeta Ionescu[1], Tudor Stancioiu[1], Gary Tabor[2], Gabriel Oppler[2], Debra Davidson[3], Zachary Wurtzebach[2], Nuria Selva[4], Marta De Barba[5], Niko Balkenhol[6], Stephen Woodley[7], Jodi Hilty[8]

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[7] *World Commission on Protected Areas*
[8] *Yellowstone to Yukon Conservation Initiative*

Title: *Connectivity conservation from science to practice for supporting smart infrastructure development in the Southern Transylvania* (oral presentation)

Abstract: In the early 2000s, the European Landscape Convention was the first international treaty to be exclusively concerned with all dimensions of European landscape trying to secure protection and planning of the landscapes. Later on, global connectivity conservation efforts are focusing on designing, governing, and managing for effective ecological connectivity (IUCN WCPA CCSG 'Guidelines for Conserving Connectivity through Ecological Networks and Corridors'). The Carpathian Mountains in Central and Eastern Europe are one of the world's most biodiverse and intact wild places, stretching across seven countries (Czech Republic, Hungary, Poland, Romania, Serbia, Slovakia, and Ukraine). Largest carnivore's populations are found in the Romanian Carpathians; however, this generates management challenges under extremely high population densities. Based on high-quality spatial data for large carnivores and prey species (fine-scale maps from landscape genetics, GPS telemetry datasets and least-cost path modelling), we conducted the first-ever ground-testing exercise of forthcoming IUCN guidance for designing, governing, and managing for effective ecological connectivity, to generate regional/local solutions and to identify areas of priority. Further, we compared this information to the extent, configuration, and management of the current ecological network. These recommendations in terms of design, governance, and management range from considering the wide variety of uses including existing management and protections within a particular area of ecological connectivity, forming stakeholder coordinating mechanisms, and the integration of avoidance and mitigation measures in the earliest stages of highway infrastructure planning and design. Outcomes of this ground-breaking exercise are designed to motivate action beyond national borders for sustainable

landscape governance. As more than 50% of the Carpathian ecosystem is found in Romania, it is positioned to take a leadership role in connectivity conservation in much of Europe. The potential exists in replicating the usage of the IUCN guidance in other nations and regions to ensure effective delivery and consistent implementation of ecological connectivity practices.

Keywords: connectivity, governance, ecological corridors, management

5.Author(s): **Mauricio Sanchez-Martinez[1], Melanie Kolb[1], Adriana Flores-Diaz[1]**
[1] *Universidad Nacional Autonoma de Mexico*

Title*: Assessment of nature contributions to people and participatory water monitoring in the Rio Hondo river basin: A proposal for implementation* (oral presentation)

Abstract: In transdisciplinary approaches and citizen inclusion programs, such as participatory water monitoring, evaluation of Nature Contributions to People (NCP), can provide information about the importance that populations associate with socio-ecological land units of their local environment, as well as its potential to be monitored and managed. In this study, NCPs are assessed in the Rio Hondo transboundary river basin (three Belizean and three Mexican communities) from the perspective of hydrological ecosystem services, considering the components supply, demand, and benefits. Supply was estimated by a water balance (Thornthwaite method). Demand was assessed by interviews at local scale and considered the registered concessions for surface, underground and residual discharge. NCP were identified and prioritized at local scale by hierarchical methods in 6 terrestrial land units, 5 hydrological units and 2 water supply systems. Benefits were ranked through health, sociocultural, and monetary values. Most of water demand is supplied by underground concessions, nevertheless, is not satisfied, so people depend of rainwater. Peaks of precipitation occurs in June and September were people can get more rainwater for drinking and cooking. There is a deficit of precipitation between January and mid-April so people suffer water scarcity, especially for livestock and crop irrigation, so they use alternative water sources like Rio Hondo water. Most of the residual discharges come from the industry and are discharge into sewers that intercept the Peninsula de Yucatan aquifer. It could be a risk for population that get most of their water demand from wells. Local demand determined by the prioritization of the socio-ecological units benefits, is linearly correlated with the number of NCP people identified and are different in each community. Same occurs for health, socio-cultural and

monetary values. However, the sum of values offers a comprehensive local view prioritization to determine action plans like participatory water monitoring system.

6.Author(s): **Kičić Martina[1], Marin Ana Marija[1], Vuletić Dijana[1], Krajter Ostoić Silvija[1]**
[1]*Croatian Forest Research Institute,* Croatia

Title: *Perception of cultural ecosystem services in relation to different types of urban green infrastructure - case study of Zagreb, Croatia* (oral presentation)

Abstract: Urban green infrastructure (UGI) provides invaluable services and benefits for urban population contributing to their sense of wellbeing. Among these are cultural ecosystem services (CES). These are often defined as non-material benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation, and aesthetic experiences (MEA, 2005). Despite their importance for urban population and the prevalence of cultural landscapes in Europe, these services are less explored than others. Urban planning and green space management is often expert-based and leaves out perception of citizens as users and beneficiaries of services and benefits UGI provides. This is very true for the city of Zagreb (Croatia) as well where our research took place. We used mixed method approach to explore perceptions of CES of UGI at the city level. Besides exploring perception of CES of UGI we also explored how CES is perceived based on the different types of UGI. We conducted focus groups in each city district (altogether 20 focus groups and 94 participants). Focus group participants also pointed on maps exact locations in which they perceive specific CES (namely place attachment, aesthetics, recreation, education, and cultural identity). Using spatial and statistical analyses we were able to find out how CES of UGI are distributed based on type of UGI and which types are perceived as providing more CES than others. We believe the results would be relevant for (urban) planners and managers of UGI.

7. **Author(s): Frederick Steiner[1]**
[1]*Weitzman School of Design, University of Pennsylvania, Philadelphia , USA*

Title: *Landscape Governance: The Prospects of the SITES Rating System*(oral presentation)

Abstract. Landscapes are a synthesis of cultural and natural processes of a place. As such, landscapes provide an ideal framework for sustainable governance. The Sustainable Sites Initiative (SITES) is a rating system that advances best practices for landscape design. The system is grounded in the ecosystem services concept. Administered by Green Business Certification Inc. , SITES has been adopted by the cities of New York and Atlanta, the state of Rhode Island, and the U.S. General Services Administration to guide design decisions.

Keywords: SITES, Sustainable Sites, suitability analysis

8.**Author(s**) **Anton Shkaruba[1]; Hanna Skryhan[2]; Iryna Shylava, Viktar Kireyeu[3]**
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[2]*Belarusian-Russian University*
[3]*Saint Petersburg State University*

Title: *The hated nature: what it takes to reconcile ecosystems of a small river with urban communities*. (oral presentation)

Abstact. Nature is not welcome in many urban contexts. City were long (and still are) considered as an opposite to wilderness, and ecosystems there were either transformed to become "cultural landscapes" and a useful part of urban fabric, or considered as uncomfortable and neglected spots in need for "recultivation", "gentrification" or other "development" alike. Small rivers and riparian ecosystems appeared to be among the least valued ones, as seen from many channelised, tunneled, or completely disappeared rivers across the globe, while surviving ones are often in marginalised areas and under heavy environmental impact. Nature-based solutions (NBS) as a concept suggest a trajectory for "urban" ecosystems to retain their original character while being accepted and valued by citizens for providing useful benefits. Its practical implementation involves many challenges, and successful examples of reconciling riverine ecosystems with urban communities are relatively few and occur only in some particular geographical contexts. In this paper we explore the modalities of river and people coexistence in the city of Mahilioŭ in Belarus, recognising particular challenges of Eastern European contexts. On one hand, city planning culture in the region is not fueled by burgeoning economies and therefore declining over recent decades. On the other hand, nature wilderness is sufficiently abundant in the closest countryside, and therefore it is less appealing in urban locations. We used questionaries and semi-structured interviews to link subjective, material and relational aspects of social well-being to ecosystems (including their functions) of a small river of Dubravenka cutting through the whole city, from outskirts to the very downtown. These findings were placed in a broader environmental, planning and governance contexts with an ultimate purpose to understand what physical, information and learning

infrastructures are missing to create a case for NBS and reconcile the river with the city, and what are the enabling and disabling conditions.

9. **Author(s) Marcin Spyra[1], Guillermo Martinez Pastur[2]; Daniele La Rosa[3], Nica Claudia *Caló*[1]**
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[3] *University of Catania, Italy*

Title*: **Policy making and spatial planning for reducing ecosystem services trade-offs in peri-urban landscapes** (oral presentation)*

Abstract: Ecosystem services (ES) trade-offs occur in the situation, where one service increases and fosters the reduction of the other service. ES trade-offs are a significant issue, fostering the sustainability of transitional, peri-urban landscapes (PULs). It is due to dynamic processes of peri-urbanization, which endanger peri-urban natural ecosystems and their services. It is also related to rising demand for ES in PULs. Policy making, and planning related to ES trade-offs in PULs need to support the balancing of opposing services, thus to foster ES synergies between ES. Nevertheless, ES trade-offs in PULs are not on the top of policy and planning agendas. Knowledge related to policy making and planning for ES trade-offs in PULs remind hidden in country and regional case study specific niches. Aims of our study are twofold. Firstly, we are aiming to identify existing shortcomings, concerning to how ES trade-offs in PULs are addressed by policy instruments and planning documents. Secondly, we are aiming to describe good practices related to governance and planning of ES trade-offs in PULs. To fulfil our aims, we designed a semi-qualitative survey, which has been distributed to researchers and policy makers of different regions world-wide. The survey analyses drivers of ES trade-offs in PULs and gather practical knowledge on how policy and planning instruments at the regional level are tackling the issue of ES trade-offs in PULs. From the preliminary results obtained by the survey, we draft recommendations for policy and planning on the regional level to better tackle ES trade-offs in PULs.

Section 6.   Ecopracticology: a new name for some old ways of thinking

1. **Author(s) Antidius Raphael[1], Makarius C.S. Lalika[1]**
[1]*Sokoine University of Agriculture, Tanzania*

Title: ***Riparian Vegetation and River Ecosystem Stability: The Role of Ecohydrology*** (oral presentation)

Abstract: Riparian vegetation occurs along a watercourse mainly rivers saving river ecosystem by preventing bank-erosion and trapping sediments and pollutants; increasing its stability. Unfortunately, they are still under anthropogenic catastrophes where not well recognized. Ecohydrology, a science using biota to regulate ecology and hydrology seeks to explore their role to river ecosystem stability. To explore their roles, a study was carried out along Ngerengere river -Tanzania to investigate riparian vegetation distribution, anthropogenic stressors and their impacts to the river ecosystem. Vegetation distribution was examined within a 5m belt transect by GPS and analysed by GIS, anthropogenic stressors and their impacts by field observation and household questionnaire thereafter analysed by SPSS. Seven riparian vegetation species; Pennisetum purpureum, Phragmites mauritianus, Typha domingensis, Phragmites australis, Cyperus rotundus, Sesbania sesban and Ficus sycomorus were found with a declining abundance alongside the river. The major stressors were found to be uncontrolled cultivation practices, grazing and sand extraction. As cultivation approached the river, vegetation became scanty, disappearing in some, water got dried, with reduced clarity, deposited sediments and collapsed river banks (aggravated by sand extraction). Contrary to where vegetation was cleared by burning and harvesting as livestock fodder, abundantly vegetated sites were associated with clean and clear water. Ngerengere river ecosystem was anthropogenically degraded and less-stable whose riparian vegetation are undervalued. Recommended was riparian buffer strips via practical Ecohydrology to enhance ecological systems, reverse degradation and enhance river ecosystem stability.

Keywords: Ecohydrology, Ngerengere river, Riparian vegetation, River ecosystem, Tanzania

2. Author(s) Carla-Leanne Washbourne[1]
[1]*University College London, United Kingdom*

Title: *When you push the boundary, does the boundary push back?* (oral presentation)

Abstract: In a recent review paper for Current Opinion in Environmental Sustainability, focussing on the potential for urban experimentation to nurture knowledge and learning for urban sustainability, my colleagues and I reflected that: "knowledge about co-production advances often occurs faster than the theorisation thereof. Advances are characterised by 'learning by doing'… through applied and transdisciplinary work." There is a clear and increasing recognition that the combination of research and practice, theory and real-world experience, topped off with a reflexive approach is critical to developing interactions that can help us to both understand and respond to socio-ecological challenges. In our work creating and studying CityLabs (spaces for knowledge co-production to enable different levels of government to address urban sustainability challenges) we note that disruptive interventions and experiments are often founded on the premise that a combination of academic and practice-based knowledge is better positioned to provide policy responses to complex urban sustainability challenges than either individually. Operating within this particular space of the human-nature / human-human system highlights a range of challenges and opportunities for: "creating shared understanding across a range of actors in safe or neutral spaces that enable dialogue between knowledge brokers in government, academia and beyond". The Green Space CityLab for London project is currently working to create an ongoing platform for strengthening connections and knowledge sharing. The CityLab recognises that while there is an increasing body of knowledge and experience around the effective planning, development and management of urban green spaces, it is still challenging to make a holistic case for their overall benefits. This talk covers the background to and development of the CityLab, reflecting on the actions of those in this scholar-practitioner space to grapple with creating and translating knowledge across the boundaries of academia, society and policy.

Keywords: environmental policy, knowledge systems, urban, practice

3. Author(s) Neshafati Fwaya[1], Makarius C. S. Lalika[1]
[1] *College of Forestry, Wildlife and Tourism, Sokoine University of Agriculture,Tanzania*

Title*: Integration of Ecohydrological Solutions In Restoration Of Nzovwe River In Mbeya-Tanzania* (oral presentation)

Abstract: Many rivers, lakes and reservoirs are continuously affected by human activities causing enormous environmental problems related to biodiversity, ecosystem functioning and preservation of the water cycle. Nzovwe River is among the threatened ecosystem consequently causing decline in supply of ecosystem services such as drinking water, agricultural land and grazing land. Ecohydrological approach can be a tool towards a sustainable use of aquatic resources through enhancement of the resistance, resilience and buffering capacity of fluvial corridors. This study was conducted in order to integrate ecohydrological solutions on management of Nzovwe River for sustainable supply of ecosystem services. This was attained effectively after human activities along the river and their impacts were determined. Field observation and review of relevant published and unpublished documents were used to identify human activities and their impacts along the river. Human activities carried out along the river include agriculture, irrigation, sand extraction, garage activities and brick making. Those activities cause soil erosion and consequently increasing suspended particles into the river and expansion of the river. Also, the river is polluted due to the use of synthetic fertilizers, pesticides and garage chemicals. Irrigation activities reduced the river flow consequently affecting biodiversity of the river. Lastly, due to urbanization, the river experience midnight dumping of wastes including dead animals. Conservation agriculture, maintaining riparian vegetation and construction of buffer strips were recommended as appropriate ecohydrological solutions to nurture Nzovwe River by involving multi-stakeholder approach along the river.

Keywords: Ecosystem services, Human activities, Biodiversity, Water

4. **Author(s): Mariana Diana Rodica Pânzaru[1], Cristian-Ioan Iojă[1], Diana-Andreea Onose[1], Simona-Raluca Grădinaru[1], Ana-Magdalena Baidan[2]**
[1] University of Bucharest, Faculty of Geography, Center for Environmental Research and Impact Studies, Romania
[2] Université de Lille

Title: *Shopping centers green spaces: A new approach for urban greenery?* (oral presentation)

Abstract: The human's need to interact with nature has introduced a new approach in marketing design. Large shopping centres image, such as malls and hypermarkets are increasingly enhanced with interior gardens, lawns, squares, fountains and various floral ornaments. Besides aesthetic role of green spaces, their promotion within shopping centres contribute to the increase of the buyer's welfare. In Bucharest, the number of shopping centres has been increasing after the end of the communist regime, representing a handy alternative for replacing former abandoned industrial areas after the post-socialist restructuring. Despite this expansion of shopping centres, there is a lack of attention to the quality of green spaces and interior design, compared to the demand for the allocated green space. The present study focuses on these issues and emphasizes the importance of green spaces in shopping centres in terms of the potential to provide an environment for recreation, social interaction and the promotion of a healthy life. The results, have showed that shopping centres that were opened after Romania has joined the European Union, through high investments, hold green spaces that serve multiple purposes, targeting various needs of the customers (aesthetic, recreational area and socialization, playgrounds for the children). Therefore, in the context of the land availability within Bucharest Metropolitan area, which is increasingly limited and the availability for new build-up areas is constantly decreasing, the reorientation of shopping centres towards the integration of green spaces in order to ensure customer needs and in the same time targeting to provide ecosystem services, can represents a new approach in the integration of natural and social systems in the environmental and landscape territorial planning.

Keywords: green spaces, urban greenery, population well-being, shopping centres