



Role of the cultural ecosystem services provided by natural heritage in forest territories for sustainable regional development

Miglena Zhiyanski^{a,*} , Maria Glushkova^a, Yonko Dodev^a, Mariam Bozhilova^a, Rositsa Yaneva^a ,
Desislava Hristova^b , Lidiya Semerdzhieva^c 

^a Forest Research Institute - Bulgarian Academy of Sciences, Sofia, Bulgaria

^b National Institute of Geophysics, Geodesy and Geography - Bulgarian Academy of Sciences, Sofia, Bulgaria

^c Faculty of Geology and Geography, Sofia University "St. Kliment Ohridski", Sofia, Bulgaria

* Corresponding author: miglena.zhiyanski@gmail.com

ABSTRACT

Key words:
benefits, cultural ecosystem services,
forest areas, natural heritage

The paper focuses on the role of the Natural Heritage in Forest Areas (NHFA) as a resource that can generate economic, social and environmental benefits for society through the provision of a wide range of cultural ecosystem services. In the assessment of the role of NHFA, the approach for assessment and mapping of ES in a given territorial scope was applied in a pilot region of Velingrad Municipality, focusing on the capacity of the forest ecosystems to provide cultural ecosystem benefits and services to the people. The study confirms that the identification of NHFA could be a powerful driver for regional development by creating significant positive effects such as improving sustainable cultural tourism in forests, diversifying forestry and supporting sustainable development and management of forest areas. The integration of the cultural services of NHFA into forest-related legislation can encourage job creation in different sectors and for different levels of employment, education and cultural training. Evaluation and mapping of ecosystem services is an appropriate tool to support the development of a concept and methods for assessing and mapping the general knowledge framework for NHFA policy in Bulgaria by applying an interdisciplinary approach.

Article processing

Submitted: 10 August 2021

Accepted: 23 October 2021

Published: 29 December 2021

Academic editor: Mariyana Nikolova

© M. Zhiyanski et al. This is an open access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

1. Introduction

The concept of ecosystem services (ES) is becoming increasingly relevant and popular since the publication of the Millennium Ecosystem Assessment (MEA, 2005), with increasing attention and research on the impact of ecosystem services for the human well-being (Van Jaarsveld et al., 2005; TEEB, 2010a; TEEB, 2010b; Burkhard et al., 2012; Dodev et al., 2020). Part of the studies are focused on the economic consequences of the loss of various ecosystem services, while others are focused on revealing the less sensible ecosystem benefits (Egoh et al., 2012; Bagstad et al., 2013; Garcia-Nieto et al., 2013).

The unsustainable use and degradation of ecosystems can lead to a reduction in service delivery capacity and ultimately affect the quality of life of the human population (MEA, 2005; TEEB, 2010a). For example, increasing food production as an ecosystem service is accompanied by the conversion of forests into agricultural land, putting pressure on other services, which in turn can: reduce the potential for the provision of clean air and water, reduce the ability of the systems to control floods and drought, limit the opportunities for ecotourism development, etc. (MEA, 2005; Foley et al., 2011).

The growing concern about the unsustainable resource consumption has led to the integration of ecosystem services into international and national policies. In 2010, during the 10th meeting



of the Conference of the Parties to the Convention on Biological Diversity a global Strategic Plan for Biodiversity for 2011 - 2020 was adopted that was later supplemented by the Aichi Biodiversity Targets. These targets consider the ES as an element in the global expansion of protected areas, as well as a component of priority protection and restoration.

The concept of ecosystem services is now integrated into the current biodiversity policies both globally and at the European level (CBD, 2010), with policies generally describing how ecosystems and biodiversity can be integrated into the process of decision-making, in the public sector and business, as well as in cases where natural resources are underestimated or even neglected.

For the purposes of this study the Natural Heritage in Forest Areas (NHFA) is defined as "geospatial natural element of the socio-ecological system located in forest areas, which provides lasting and sustainable material and spiritual benefits for past, present and future generations."

The Bulgarian people have been always inextricably linked to the forest in historical, social, economic, cultural, religious, and emotional aspects. The Great Bulgarian Forest (Magna Silva Bulgarica) was the largest forest area in Southern Europe, stretching from the Black Sea to the Adriatic and from the Danube River to the Rhodope Mountains, well-known in the Antiquity and in the Middle Ages. The centuries-old, impassable forests are inextricably linked to people's everyday life and to the cultural and spiritual development.

Currently, the protection of forests and their sustainable management are a top priority not only for the EU, but also for Bulgaria as one of the European countries with the most extensive forest areas. They cover approximately 38% of the territory of Bulgaria and represent a natural resource with a key role for the entire Balkan region. The country is located between three climatic zones, which favors the presence of many rare and endemic species and nowadays Bulgaria ranks on third place in Europe in terms of biodiversity. The lands and forests within the forest territories support over 80% of the protected plants and over 60% of the endangered species in the country. More than 55% of the forest territories are part of the Natura 2000 network and represent a main resource of the natural heritage, ensuring the existence and development of a number of economic sectors in the country.

A network of 3 national and 11 nature parks, 90 reserves, over 346 natural landmarks and over 37,000 km of marked eco-trails has been built on the territory of Bulgaria. Of particular importance for the effective protection of the natural heritage is the membership of two Bulgarian national parks in the network of the European Network of National Parks - PAN Parks. In addition to recognizing that a protected area preserves biodiversity of high conservation importance, PAN Parks Certificates are also proof of the role of the natural heritage for the society through the development of sustainable tourism and recreational practices - a source of livelihood for the local population. In 2003, the Central Balkan National Park became a member of PAN Parks - an international recognition of its unique, well-preserved and managed wildlife. After the acceptance of the Rila National Park in PAN Parks in 2005, local people have an exceptional opportunity to attract global interest in Rila Mountain and its valuable and well-preserved biodiversity.

The current article discusses the NHFA as a resource that can generate economic, social and environmental benefits for the society through the provision of a wide range of cultural ecosystem services following similar studies on cultural ES (Prodanova 2021; Silvestriev et al. 2021; Nikolova et al. 2021). In particular, the focus is on the role of NHFA in the context of cultural benefits as a source of

unique opportunities for social and economic development for the mountain regions in the country.

2. Materials and methods

The approach for assessment and mapping of ES in a given territorial scope was applied in a pilot region of Velingrad Municipality, focusing on the capacity of the elements to provide cultural ecosystem benefits and services to the population. The pilot region covers the territories of State Forest Enterprises (SFEs) Alabak, Yundola, Chepino and Chehlyovo.

To assess and map the condition of the natural heritage in the forest territories we followed the Methodology for assessment and mapping of woodland and forests ecosystems' condition and their services in Bulgaria (Kostov et al., 2017). Given the case study in Velingrad Municipality data - tables with attributive data and shapefiles, was retrieved from the available Forest Management Plans and datasets - and used as basis for further analysis. The afforested territories (completeness ranging from 1-10) of the State forestries Alabak, Yundola, Chepino, and Chehlyovo were considered and the indicators Plant diversity, Animal diversity, Habitat diversity, Soil heterogeneity, Geomorphological heterogeneity, Matter storage - biomass were used for the assessment.

We applied the abovementioned Methodology (Kostov et al., 2017) by assessing several indicators derived from the information provided on parameters and in combination with expert-based assessment. Each indicator (where information is available) was given a score from 1 to 5 in regards to the data for the specific parameter per subunit level from the SFE plans.

Later, the datasheets were joined to the related GIS layers where each field (polygon) was associated to the resulting score. The territories occupied by forests on subunit level outline polygons that were related spatially to the corresponding score 1-5. The final map (Fig. 1) was generated in geographic coordinate system ETRS 1989 by using ESRI ArcGIS software.

The same procedure was applied to assess and map "cultural heritage" and "aesthetic value" from the group of cultural ecosystem services. The assessment and mapping of were performed by applying a method of using data from forest inventory based on a spatial proxy method and GIS tools for approximate analysis. As a result, maps at a scale of 1:25 000 of each service was prepared based on - forests management plans of Executive Forest Agency (FMPs of EFA), shown in Fig. 2.

The assessment and mapping of the aesthetic value of the cultural heritage in forest territories were performed by applying a method of photoelucidation, by analyzing the number of photographs on the Internet with an indication of regions and objects falling on the territory of the pilot region.

3. Results and discussion

3.1. Cultural ES from the natural heritage in the forest territories

The geospatial natural elements, which include NHFA, provide a wide range of ecosystem services - provisioning, regulating and cultural, which are based on their functional characteristics, as one function can provide multiple ES, and one ES can be the result of several functions.

The mapping results demonstrate that the pilot area is dominated by ecosystems in moderate condition, and areas in very good condition are below 3% and located mainly in protected areas. Given that the concept of assessment and mapping of ES has a broader scope, systematic and dynamic, in its experimental application for the pilot region the focus is on the cultural services of NHFA. The

assessment of the capacity of forest areas to provide cultural ES is based on a preliminary prioritization of services according to the CICES V 5.1 classification, based on a questionnaire survey of 35 experts (scientists, forest officials, representatives of local and regional administration), using the following scale:

Table 1. Assessment scale for NHFA.

Assessment	Capacity of NHFA to provide ES
0	Not relevant
1	Very low
2	Low
3	Medium
4	High
5	Very high

The visualization of the results represents the overall forest ecosystem condition, where, according to the data obtained,

dominates good condition and very good condition, marked in polygons within the Natura 2000 sites.

The results obtained for the two priority cultural ecosystem services demonstrate medium to high capacity of forest areas to provide them, which confirms the important role of forests for the society as an object of natural heritage in both cultural and socio-economic aspects. Bulgaria has an important natural resource and after the Liberation in 1878, a special administrative legal regime was created to regulate the relations to the forests, through the prism of being a national treasure. Even the nationalization proclaimed by the People's Republic of Bulgaria (1947), excluding its political reasons, is a manifestation of the national perception that forests are a national resource that must be rationally used and reproduced in the public interest. In this context the special forest legislation and the administrative legal regime must contain clear perspectives for the development of the forest sector, to reflect its specifics, as well as to be adequately protected at the European level. This is a necessary and mandatory condition for the proper functioning of the forestry sector.

Sustainable forest management is a priority for the EU and is of great importance for the ability of forests to continue to perform

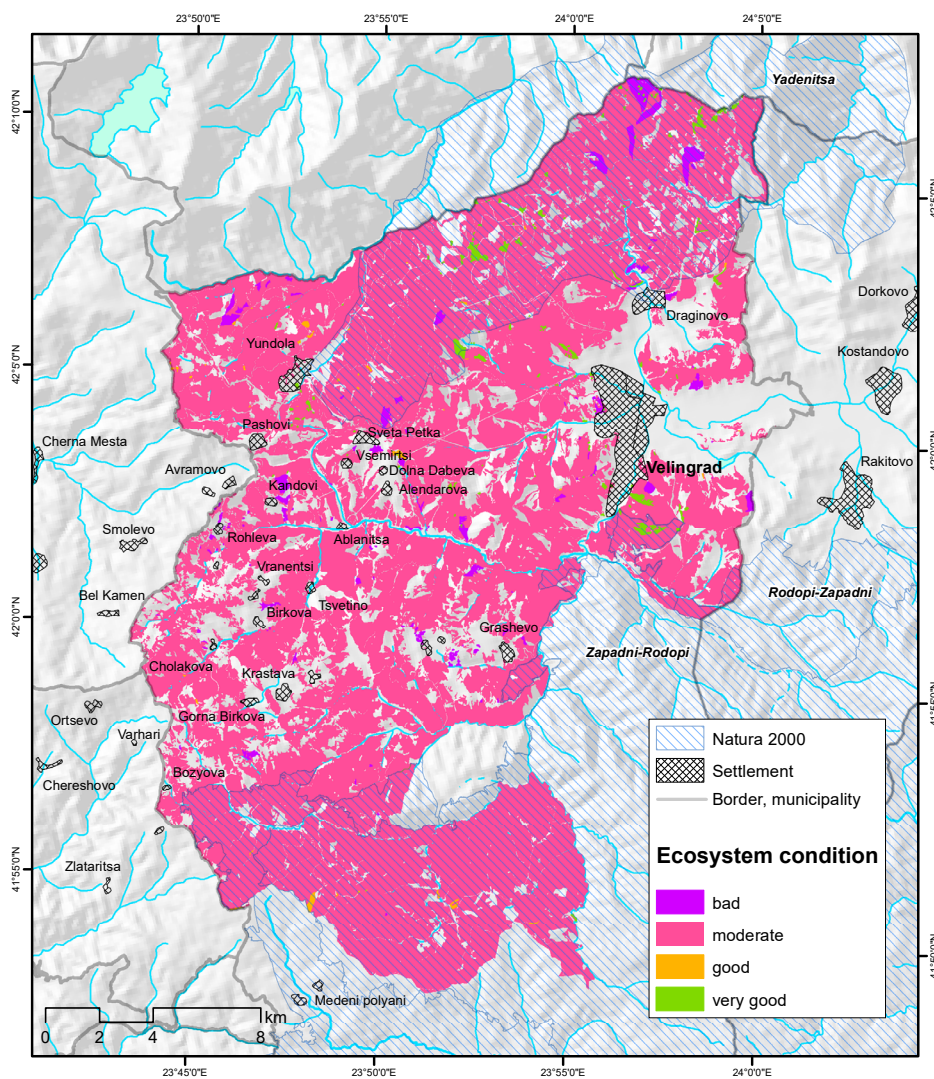


Figure 1. Assessment of the condition of the natural heritage in the forest territories in the municipality of Velingrad.

their economic, environmental and social functions. Sustainable forest management is also the main mechanism through which the EU could achieve its climate goals and provide the necessary ES such as biodiversity, protection against natural disasters and carbon (CO₂) sequestration from the atmosphere (EP Resolution of 11 May 2011, promulgated OJ C 377, 7.12.2012, pp. 23–35).

Concerning certain territorial units, the theoretical link between NHFA, democracy, and society is related to the broader link between forest management and society. However, as there is no specific definition linking NHFA to social well-being and social inclusion, the present review takes on a general character that could be used in this specific area: to maintain and ensure accessibility and a "right" society to enjoy its free time in forests and forest areas based on combining specific socio-cultural and economic needs, which will contribute to the well-being improvement.

According to the results obtained, NHFA has the potential to contribute significantly to the creation and strengthening of social capital, as it can improve the health, quality of life and well-being of people and communities. Dodev et al. (2020) underlined the need of implementation of "Forest Welfare Services" which refer to social and cultural services for the population based on forests and forest resources that aim to improve human health and well-being. The main types of Forest Welfare Services could be summarized

as follows: forest therapy, recreation, education, culture, sport activities. Moreover, NHFA contributes to reducing social differences, facilitates social inclusion through participation and promotion of intergenerational dialogue, cohesion, but also plays an economic role as an integral part of the forestry sector.

This is supported by the fact that the identified NHFA is a powerful driver for inclusive local and regional development by improving sustainable cultural tourism in forests and supporting sustainable development and management of forest areas. At the same time, job creation is encouraged in different sectors and at different levels of work, education and cultural training. In this regard, there is a need for wider integration of NHFA into the national forest policy. The elements of the NHFA are based on an assessment and mapping of ecosystem services (ES) as a concrete expression in a specific territorial context and in places that provide different cultural aspects of the NHFA policies.

Through ecosystem services, a concept and methods will be developed for assessing and mapping the general knowledge framework for NHFA policy in Bulgaria by integrating development approaches (in terms of social dimensions: economy; education; governance; social participation; gender equality; communication; heritage) for further inclusion in policy documents (related to forests).

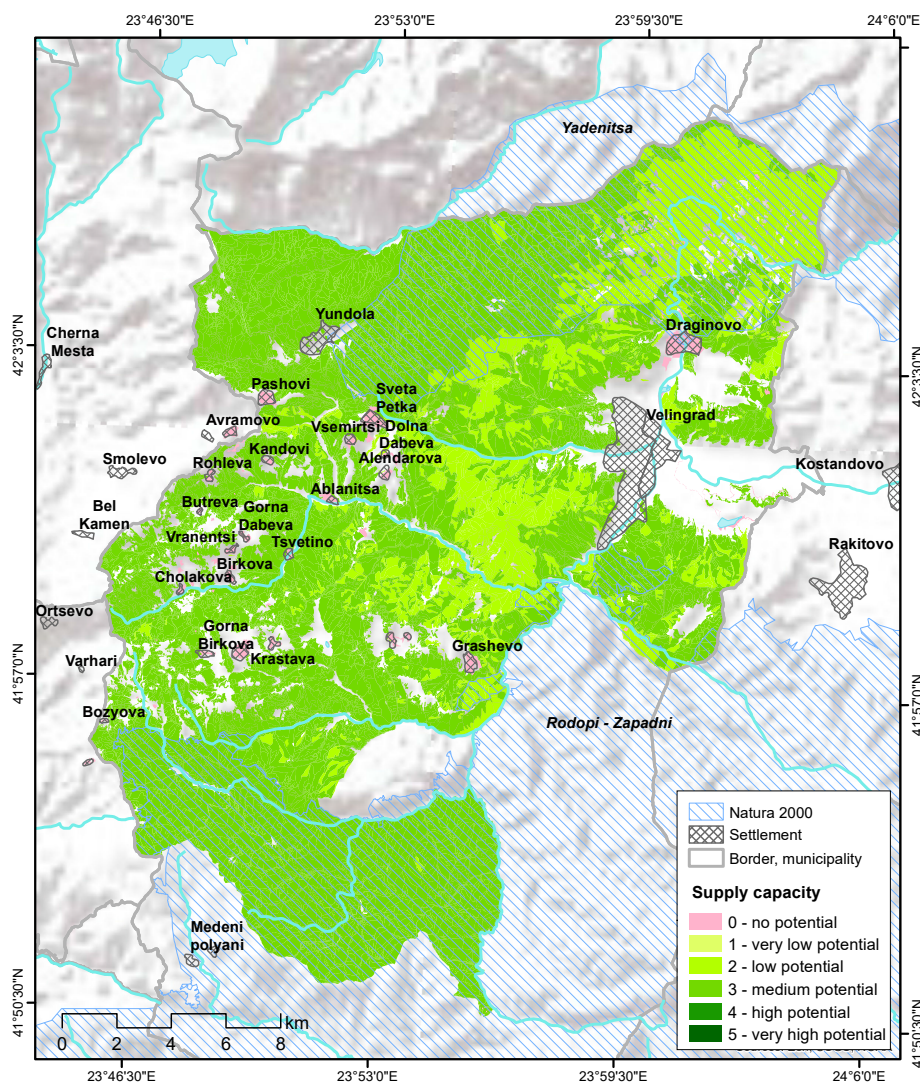


Figure 2. Cultural heritage in forest areas.

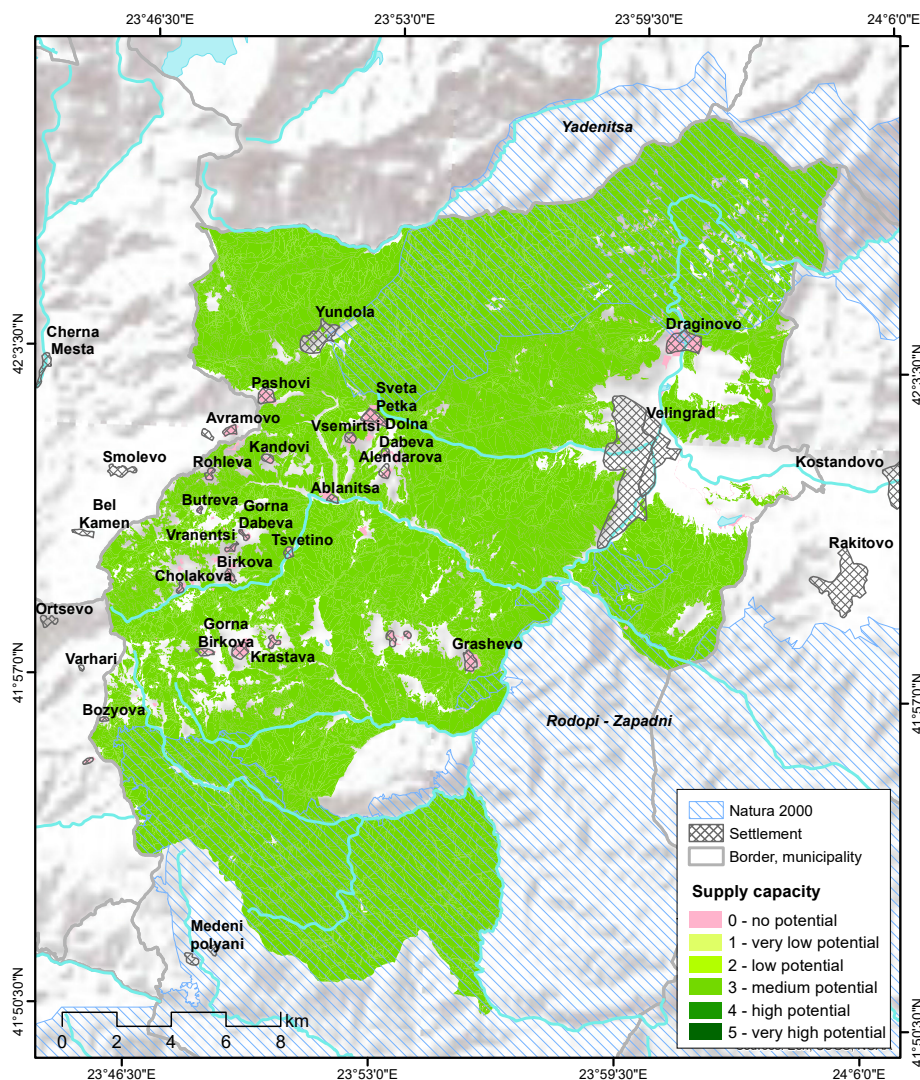


Figure 3. Aesthetic value in forest areas.

Based on previous studies about the role of NHFA as a source of unique opportunities for social and economic development for Bulgarian regions, policy recommendations are timely and necessary to assist policymakers in developing and implementing territorial strategies and forest policy. In the context of the present study, some policy recommendations to implement at local and regional levels are proposed based on the assessment and mapping of cultural ecosystem services. The natural heritage in forest territories (NHFA) as a source of public welfare in Bulgaria urgently needs to be emphasized in the key national policy documents, in order to achieve the goals for sustainable development of the regions.

4. Conclusion

The study confirms that the identification of NHFA could be a powerful driver for regional development by creating significant positive effects such as improving sustainable cultural tourism in forests, diversifying forestry and supporting sustainable development and management of forest areas.

The integration of the cultural services of NHFA into forest-related legislation can encourage job creation in different sectors and for different levels of employment, education and cultural training.

Evaluation and mapping of ecosystem services is an appropriate

tool to support the development of a concept and methods for assessing and mapping the general knowledge framework for NHFA policy in Bulgaria by applying an interdisciplinary approach (in terms of social dimensions: economy; education; management; social participation; gender equality; communication; heritage) for further inclusion in policy documents (related to forests and afforested areas). In the context of the role of NHFA as a source of unique opportunities for social and economic regional development in Bulgaria, specific recommendations are needed to assist policymakers in developing and implementing territorial strategies and forestry policy.

Given the current trends and global changes, there is a need for the NHFA, as a potential source of public welfare in Bulgaria, to be integrated into national policy documents with a vision to the sustainable development of the regions.

Funding program

This research was funded by the BG05M2OP001-1.001-0001 Project "Creation and development of "Heritage BG" Centre of Excellence", Operational Programme Science and Education for Smart Growth, Priority axis 1, Procedure BG05M2OP001-1.001, Component 4 "New technologies in creative and recreation industries".

References

- Bagstad KJ, Johnson GW, Voigt B, Villa F (2013) Spatial dynamics of ecosystem service flows: a comprehensive approach to quantifying actual services. *Ecosystem Services* 4: 117–125.
- Burkhard B, Kroll F, Nedkov S, Müller F (2012) Mapping ecosystem service supply, demand and budgets. *Ecological Indicators* 21: 17–29.
- CBD [Convention on Biological Diversity] (2010) COP 10, Decision X/2, Strategic Plan for Biodiversity, 2011–2020.
- Dodev Y, Zhiyanski M, Glushkova M, Shin WS (2020) Forest welfare services - the missing link between forest policy and management in the EU. *Forest Policy and Economics* 118: 102249. <https://doi.org/10.1016/j.forpol.2020.102249>
- Egoh B, Drakou EG, Dunbar MB, Maes J, Willemsen L (2012) Indicators for Mapping Ecosystem Services: A Review. Publications Office of the European Union, Luxembourg. Report EUR 25456 EN.
- Foley J, Ramankutty N, Brauman K, Cassidy ES, Gerber JS, Johnston M, Mueller ND, O'Connell C, Ray DK, West PC, Balzer C, Bennett EM, Carpenter SR, Hill J, Monfreda C, Polasky S, Rockström J, Sheehan J, Siebert S, Tilman D, Zaks DPM (2011) Solutions for a cultivated planet. *Nature* 478: 337–342. <https://doi.org/10.1038/nature10452>
- Garcia-Nieto AP, Garcia-Llorente M, Iniesta-Arandia I, Martin-Lopez B (2013) Mapping forest ecosystem services: From providing units to beneficiaries. *Ecosystem services* 4: 126–138.
- Kostov G, Rafailova E, Vasilev V, Bratanova – Doncheva S, Gocheva K, Chipev N (2017) A methodological framework for assessment and mapping of the state of ecosystems and ecosystem services in Bulgaria. Methodology for assessment and mapping of the condition of forests and forest ecosystems and their services in Bulgaria. Part B4. Klorind Publishing House, 88 pp. ISBN 978-619-7379-07-5 (In Bulgarian).
- MEA [Millennium Ecosystem Assessment] (2005) *Ecosystems and Human Well-being: Synthesis*. Washington, DC: Island Press.
- Nikolova M, Stoyanova V, Varadzhakova D, Ravnachka A (2021) Cultural ecosystem services for development of nature-based tourism in Bulgaria. *Journal of the Bulgarian Geographical Society* 45: 81–87. <https://doi.org/10.3897/jbgs.e78719>
- Prodanova H (2021) Experimental mapping and assessment of ecosystem services based on multi-level landscape classification. *Journal of the Bulgarian Geographical Society* 45: 31–39. <https://doi.org/10.3897/jbgs.e78692>
- Silvestriev M, Borisova B, Mitova R (2021) Natural heritage: Provision of cultural ecosystem services from the Malyovitsa Range of the Rila National Park. *Journal of the Bulgarian Geographical Society* 45: 41–59. <https://doi.org/10.3897/jbgs.e72500>
- TEEB [The Economics of Ecosystems and Biodiversity] (2010a) *The Economics of Ecosystems and Biodiversity: Ecological and Economic Foundations*. London and Washington, DC: Earthscan.
- TEEB [The Economics of Ecosystems and Biodiversity] (2010b) *Mainstreaming the Economics of Nature: A Synthesis of the Approach, Conclusions and Recommendations of TEEB*. Geneva: TEEB.
- Van Jaarsveld AS, Biggs R, Scholes RJ, Bohensky E, Meyers B, Lynam T, Musvoto C, Fabricius C (2005) Measuring conditions and trends in ecosystem services at multiple scales: the Southern African Millennium Ecosystem Assessment - MA (2005) project (SAfMA) experience. *Philosophical transactions of the royal society* 360: 425–441.

ORCID

<https://orcid.org/0000-0003-4843-6770> - M. Zhiyanski
<https://orcid.org/0000-0003-4092-8340> - R. Yaneva
<https://orcid.org/0000-0002-7643-4978> - D. Hristova
<https://orcid.org/0000-0001-9871-6485> - L. Semerdzhieva