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Applicability of the PA-BAT+ in the evaluation of values of urban protected areas

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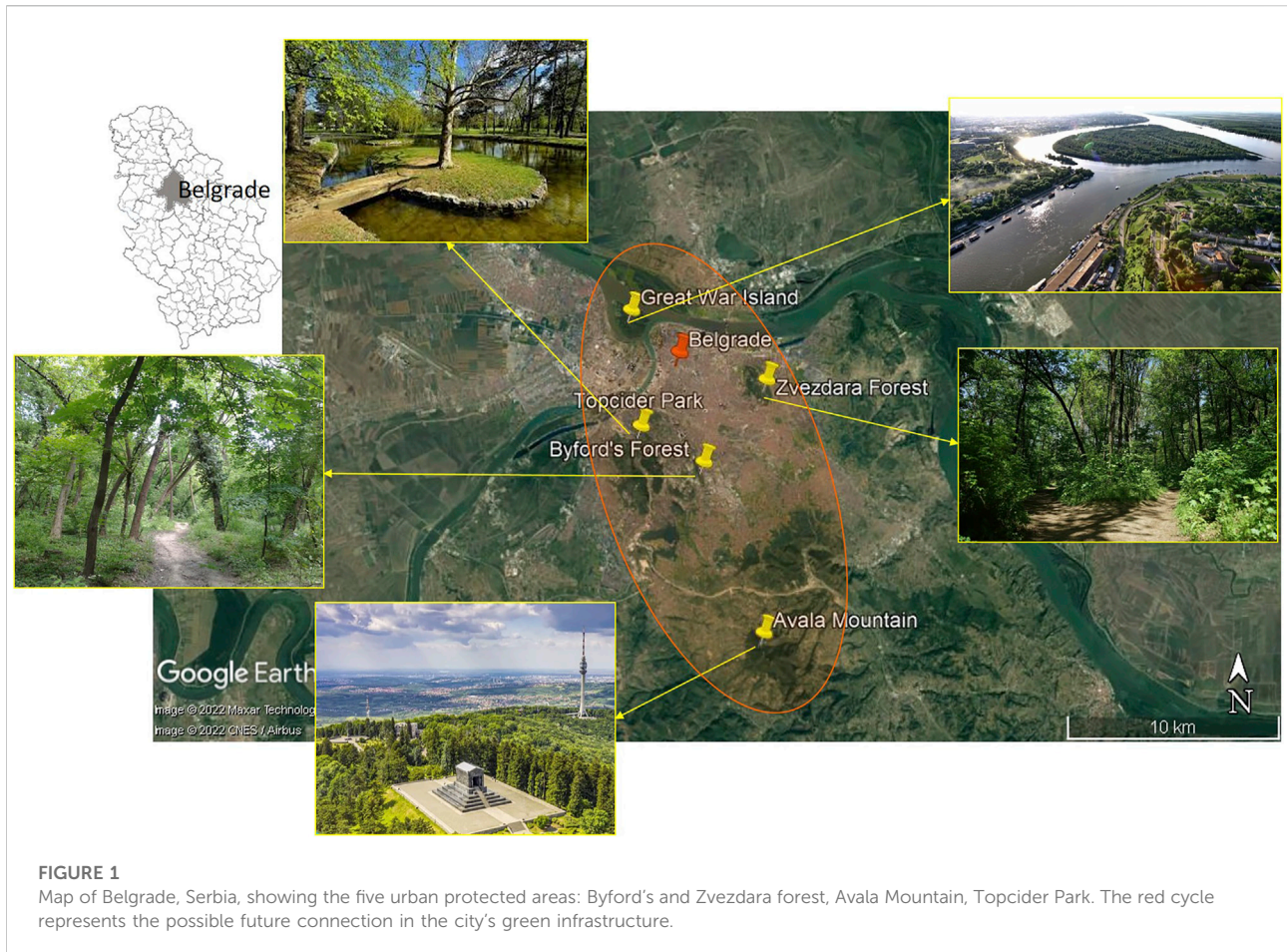
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1 Introduction

The International Union for Conservation of Nature (IUCN) has a vision that the proper evaluation of protected areas (PAs) leads to a greater interest, more significant investment, and better conservation of natural resources (IUCN, 2012). The evaluation of ecosystem services (ES) provided by protected areas (PAs) is of long-term importance to the local and national economies (Bolund & Hunhammar, 1999; Chen et al., 2020). Mapping the values of PAs, greater participation of decision-makers, and finally changes in public policies and the development of economic models that include natural resources in their development plans are significant but also long-term processes (Trzyna, 2014; Cumming, 2016; Ten Brink et al., 2016; Chen et al., 2020). IUCN has established the Protected Areas Benefits Assessment Tool+ (PA-BAT+) (Ivanić et al., 2020), which provides initial information on how different stakeholders view the current state and potential values of PAs, which can help integrate natural resources and services provided by ecosystems in development plans. Such a tool makes it possible to identify the main factors relevant to the PAs and the country's development policy, the flow of economic benefits, and the need for strategies that will enable the return of income to local people and PAs. Factors relevant to the importance of specific jobs in PAs - which is vital for the rural economy and necessary for decision-makers could also be identified with this tool. Identifying these factors can increase PA's contribution to the Sustainable Development Goals (Dudley et al., 2017), such as no poverty, zero hunger, good health and well-being for people, quality education, clean water and sanitation, sustainable cities and communities, climate action, life below water and life on land.

The primary purpose of the PA-BAT + methodology is for use by PA managers and other users of these areas, to work on identifying the most important values and benefits they bring to different stakeholders. The concept of ES (Costanza, 2000; MEA, 2005; Costanza & Kubiszewski, 2012; Costanza et al., 2014; Costanza et al., 2017) is a relatively new topic in Serbia (Sekulić et al., 2017) that has only begun to be discussed between nature conservation experts and policymakers. This paper aims to determine the applicability of the PA-BAT + methodology in evaluating the full range of current



and potential values of urban PAs. The results of the PA-BAT + analysis can be used at both PAs and national levels to improve governance and to progress appropriate policies that support nature conservation while promoting sustainable development and responsible use of natural resources (Busha & Doyon, 2019).

2 Methods

The study was developed in Belgrade (Serbia) in five urban PAs: Byford's and Zvezdara forest, Avala Mountain, Topcider Park, and Great War Island (Figure 1). According to the categorization of the IUCN, Byford's and Zvezdara forest and Topcider Park are classified in Category III: Natural monument or Features. The Avala Mountain belongs to Category V: Protected landscape/seascape and the Great War Island to Category IV: Habitats and Other Regulated Areas (Dudley, 2008). These PAs primarily contribute to the regulation and improvement of microclimatic conditions in the city. From the ecological aspect, they represent an important part of the city's green infrastructure and have a significant role in the connection between urban and suburban greenery (Figure 1). PAs could have

an important role in the mitigation of effects of urbanization and pollution which are considered a major threat to biodiversity (Antrop, 2004) and can cause large-scale extinction of native species (McKinney, 2002). They provide opportunities for many people from urban areas to experience nature, including those who may not be able to visit more distant PAs. Regular contact with nature is valuable for people, improving physical and mental health. The urban population is crucial for nature conservation, nationally and globally. Conservation depends on support from urban voters, donors, and communicators (Trzyna, 2014).

To assess non-economic, economic, potentially non-economic, and potentially economic values research was conducted using the PA-BAT + methodology (Ivanić et al., 2020). The assessment of the value of PAs was performed collected the data by questionnaires for five groups of stakeholders: local population; public sector (managers); government; civil society organizations (CSO); scientists/experts. The questionnaire covers 29 values: Is the area important: as a source of food from the wild game; honey production; wild food plants and fungi provisioning; as a source of food from fish and other aquatic animals; for agriculture/agroforestry; livestock; water provision and flow;

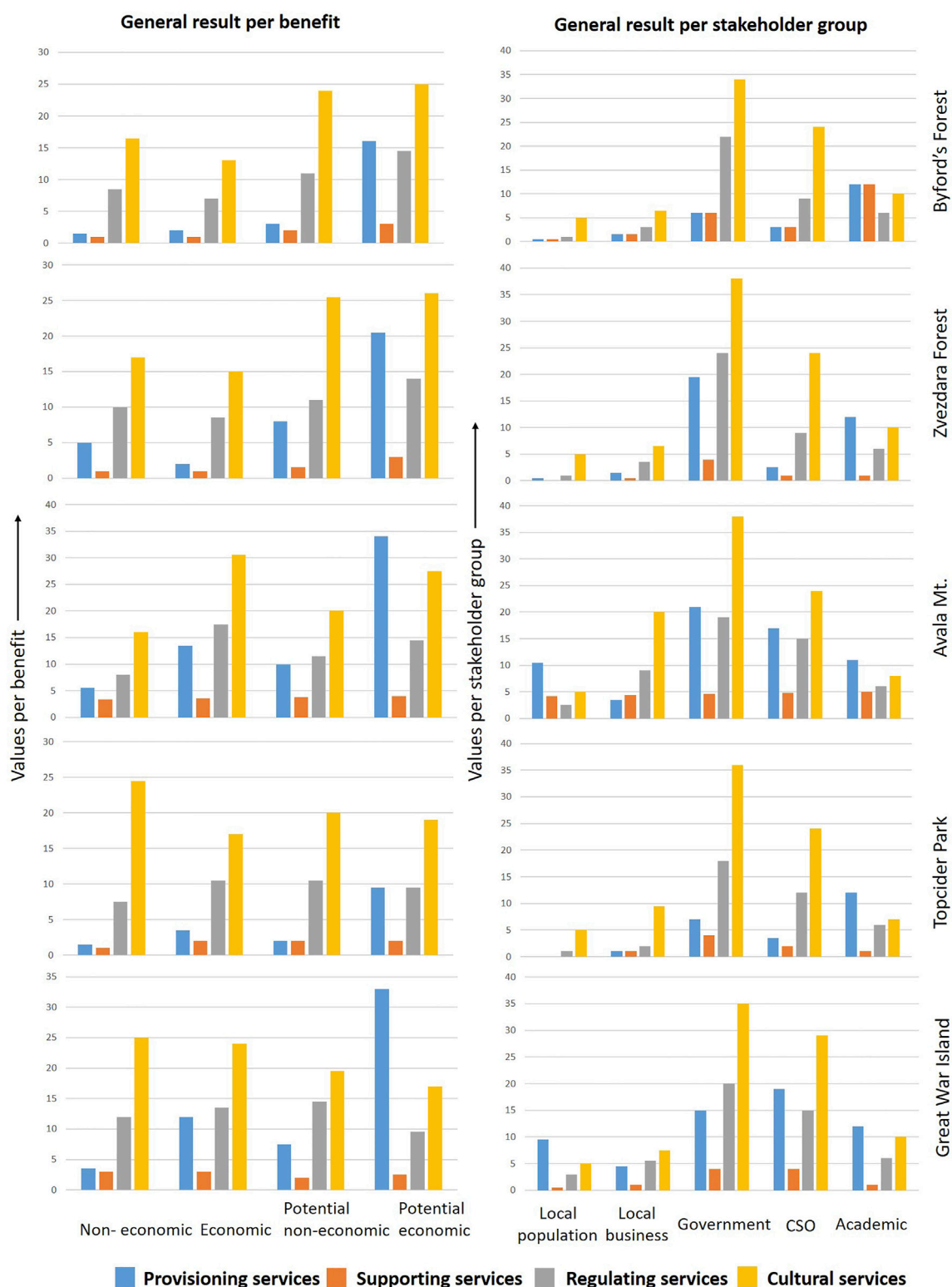


FIGURE 2 Current and potential values of urban protected areas: Byford's and Zvezdara forest, Avala Mountain, Topcider Park, and Great War Island (CSO–Civil society organization).

maintaining water quality; pollination of nearby crops; recreation and tourism; management and removal of timber; raw materials other than timber; medicinal resources; supplying ornamental resources; genetic material resources; climate change mitigation; flood prevention; spiritual or religious values; mental well-being and health; inspiring artistic outputs; cultural and historical values; peace and stability; jobs associated with biodiversity; education; nature conservation; knowledge generation; aesthetic values; soil maintenance; mitigation of pest and disease (Ivanić et al., 2020). Data analyses are performed using SPSS Statistics (IBM Corp. Armonk, NY, United States).

The values related to nature can be defined as human perceptions of qualities and benefits conveyed by nature to human societies (Hartel et al., 2020). The PA-BAT + consists of three main generic elements: benefits, the flow of benefits and the value of benefits (Ivanić et al., 2020).

The PA-BAT + distinguishes between the flows of benefits to different stakeholders. The assessment of each benefit and to whom it flows is made against seven criteria: minor and major non-economic benefit, minor and major economic benefit, potential economic, non-economic benefit and no benefit (Ivanić et al., 2020).

3 Benefits of urban protected areas

The general results by benefit and stakeholder group are shown in Figure 2 and represent differences in the identification and evaluation of non-economic, economic, potentially non-economic, and potentially economic benefits for the five urban PAs in Belgrade.

The most recognizable benefits for all five urban PAs are cultural, regulating, and provisioning ES (Figure 2). ES provides a small economic benefit in all five areas, except in Avala Mountain and the Great War Island (Figure 2). The government and CSO mostly recognize the benefits of PAs, followed by the scientific community (Figure 2). The greatest non-economic, economic, potential non-economic, and potential economic benefits among different stakeholder groups are provided by cultural, regulating, and provisioning ES (Figure 2). In recent decades, there has been an increase in recognition of the need for greater engagement of stakeholders in decision-making processes in PAs. The identification and evaluation of benefits for the five urban PAs in the city of Belgrade were also analyzed between different stakeholder groups to strengthen the linkages between managers and stakeholders at the local, regional and national levels (Manolache et al., 2018; Manolache et al., 2020).

In all PAs assessments, stakeholders did not recognize forestry as a significant economic and non-economic value, except for Avala Mountain and a smaller percentage of Zvezdara forest and the Great War Island. Most stakeholder groups recognize forestry on Avala Mountain as the greatest potential economic value. Wood, as a natural resource, is most

recognized by the government, CSO, and the scientific community. The current way of forest management in most urban PAs (primarily on Avala) is based on the principle of forest management designated for space and recreation and is less economical (Sekulić et al., 2017).

Healthy and preserved ecosystems within PAs have good potential for producing of wild edible plants, mushrooms, medicinal herbs, and honey (Locke & McPhearson, 2018). Values related to provisioning services are highly recognized in the assessment of ES of Avala and the Great War Island by the government, CSO, and the scientific community. All stakeholders recognized the potential economic value of honey production in all assessed PAs. Especially on Avala Mountain, beekeeping is rising, and quality honey and honey products result from good and diverse bee pastures. Due to high biological diversity, medicinal plants, forest fruits, and edible mushrooms are also present on Avala Mountain. These natural resources are underutilized. Local products and PAs services should provide opportunities for sustainable tourism development (local food production, the revival of handicrafts, etc.), especially in the field of branding local products (Keeler et al., 2019). These products can be considered an exceptional cultural and historical heritage (Locke & McPhearson, 2018; Keeler et al., 2019) because the recipe for their preparation has not changed for generations. Traditional agriculture and cattle grazing are not highly rated among the provisioning services. Given that these are urban PAs, agricultural production and livestock are not recognized as a relevant value (except on Avala), and a relatively small number of stakeholders (local population, managers, and government) recognize their benefits. Hunting grounds are also present on Avala Mountain and cover about 490 ha. Wild boar and roe deer are considered short games because their numbers are small. Feather game is mainly hunted - pheasant, partridge, quail, pigeon.

The importance of conserving PAs is of great importance for the adequate management of water resources, including sustainable water use, protection and purification of water, flood mitigation, and erosion prevention (Locke & McPhearson, 2018). The government has noted the relevance of healthy ecosystems for conserving water resources. Stakeholders on the Great War Island have shown that the values of PAs associated with water resources have a clear non-economic, economic, potentially non-economic, and potentially economic significance. The government and CSO have most recognized the economic value of water resources, while the local community generally recognizes the non-economic value of water. Unfortunately, ES such as water purification and flood mitigation are still not recognized by the general public.

It is very encouraging that the relevance of PAs as an area that generates new jobs is emphasized in the assessment of the government in the first place (Plummer, 2009; Locke &

McPhearson, 2018). The government as a stakeholder has generally recognized the possibility of employment in the organization that manages PAs. However, one should consider other jobs that could be related to PAs, e.g., tourism or trade-in natural and local products.

The local population, unlike the government, CSO, and the scientific community, least recognizes the values associated with regulating and supporting services: climate change mitigation, land stabilization, and flood mitigation. The ES as a new concept will require the necessary time to be accepted and adequately evaluated by the local community (Locke & McPhearson, 2018). The local community needs to be educated about the main values of the environment to understand the role of PAs (Keeler et al., 2019).

Tourism is one of the economic activities that stakeholders most readily associate with PAs. All stakeholder groups in all five urban PAs recognized values related to tourism and recreation. The local population recognized more non-economic and potential non-economic value, while the government and CSO emphasized economic and potential economic value. Many PAs have a rich cultural history and numerous cultural monuments and facilities within their borders (e.g., Avala Mountain and the Great War Island). Cultural heritage stands out not only because of its potential to attract tourists but also because of the spiritual values it has for the local population and community. Urban PAs should enable funds to invest in the protection of cultural heritage by preserving recognizable traditional values.

Recognition of the value of education is not evenly distributed among different stakeholder groups. Unfortunately, social values and benefits are often underestimated and neglected in the PA management process (Reyers et al., 2013). However, important and relevant for PAs is the fact that the government and CSO recognized the value of PAs in education and knowledge development. In PAs, education is recognized as both non-economic and economic value. Education in PAs has not yet been seriously considered or discussed among decision-makers and those directly involved in the management of PAs. Some PA managers develop and implement certain educational activities, such as the educational centre on the Great War Island that have been held for many years. However, most educational activities are mostly done without a strategic approach and long-term planning. There is usually no clear and consistent vision of developing educational programs and activities within PAs.

The assessment, done with the PA-BAT + methodology, provides a reasonable basis for gathering all relevant information on the characteristics and functioning of PAs (Ivanić et al., 2020; Ruhl et al., 2021). The described assessments are not exclusively technical processes used to assess the value and well-being of PAs. They also represent a mechanism for achieving good communication and cooperation among different PA actors (Plummer, 2009; Ivanić et al., 2020). The information

obtained can also identify the main challenges and obstacles to the integrated management of PAs (Ruhl et al., 2021). Modern PAs management concepts rely on the intensive cooperation of various stakeholders (Plummer, 2009). PAs management should not only inform stakeholders about their work but should develop opportunities to involve them in planning and management (Plummer, 2009). Bearing in mind that the analyzed PAs are managed by public companies with low participation of other stakeholder groups, especially the local community. Due to inherited political and social practices, the integration of local communities and the civil sector into public administration remains very low. The participation of different stakeholder groups significantly increases the effectiveness of PAs management but also provides a favorable environment for the development of sustainable ways of using natural resources and thus reduces the negative impacts on PAs (Keeler et al., 2019). Perceptions of interested parties are the result of educational level, demographic data, and low employment of people in environmental protection.

4 Conclusion

Human impacts on the earth's natural environment have caused the systematic crisis that has most resulted in climate changes. The emergence of the crisis has led organizations specializing in protecting the environment and nature to find sustainable solutions. These crises have led to cooperation between various stakeholders, including individual actors, governments, businesses, non-governmental organizations (NGOs) and environmental protection bodies. However, the local community and the general public are unaware of the broader range of values and benefits that PAs offer. Ecosystem services that significantly support both local and national populations are often underestimated. Many PAs have not established monitoring biodiversity, natural values, and ES. The use of PA-BAT + methodology in assessing the full range of current and potential values of urban PAs leads to the conclusion about a lack of experts in the field of nature protection, rural development, social sciences, education, and nature interpretation and tourism. Public support (or awareness of the importance and potential of PAs) is negligible. The results of the PA-BAT + assessment for urban PAs can be used by different organizations or individuals involved in nature protection, rural development or sustainable development. PAs are the primary beneficiaries of these results. However, the results can also be equally important for local governments and stakeholders trying to foster sustainable development in their areas, but they can also be used globally. Ministries and other relevant institutions developing policies for natural resource management and rural development should use PA-BAT + results to create an environment that allows the development of local, sustainable initiatives within PAs. In

this way, engaging stakeholders in PA management will help ensure that society receives many benefits from PAs. Stakeholder engagement will support the development of constructive, solid and responsible relationships critical to the conservation. Efficiency, inclusion, transparency and effectiveness are main principles for successful stakeholder engagement. Furthermore, this can lead to improved environmental performance and increased human, social and natural capital locally and globally.

Data availability statement

The raw data supporting the conclusion of this article will be made available by the authors, without undue reservation.

Author contributions

ŠŠ—the first authorship; GV—corresponding authorship; MK-G—senior authorship; NA, SS, NS, NŽ—these authors contributed equally to this work.

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