

Landscape functions: Some methodological issues for urban planning from a case study of Mtskheta, Georgia

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ABSTRACT Defining landscape functions is a pivotal aspect of landscape planning, involving collaboration among numerous specialists. These experts consider various factors such as the landscape-ecological situation, including structural and functional peculiarities, current conditions, natural and socioeconomic influences, scale, potential, sustainability, and socioeconomic functions imposed or anticipated by society. The article delves into the primary functions of landscapes and methodological aspects of their definition in urban planning. Specifically, it examines the landscape functions of Mtskheta, a historical capital of Georgia situated approximately 11 kilometers from Tbilisi. The classification units and outcomes of landscape planning are outlined. Following the research, five types of landscape functions were identified within Mtskheta: urban, environmental protection, environment restoration, recreation, and resource production. This outcome underscores the considerable ecological value of landscape planning methodology.

KEY WORDS landscape – functions – urban planning – historical landscape – Georgia

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1. Introduction

Defining natural landscape and urban landscape functions (Beruchashvili 1995, 1986, 2000; Erikstad, Uttakleiv, Halvorsen 2015; Deng et al. 2020; de Groot, van den Born 2003; Franch-Pardo et al. 2017; Tongway, Hindley 2009; Elizbarashvili et al. 2022; Matsuoka, Kaplan 2008; Willemen et al. 2008; Křováková et al. 2015) is a key issue in landscape planning (Elizbarashvili et al. 2009, Elizbarashvili et al. 2021).

Defining landscape functions holds paramount importance in landscape planning, aiming to ensure the ecological sustainability of the territory, restore the environment, and utilize it judiciously. Through landscape planning, integrated planning objectives for the territory are established: protection (preservation), enhancement, and development. These objectives were successfully realized during the landscape planning of several new protected areas in Georgia, which preceded the formulation of management plans. The adaptation of landscape planning methodology for urban areas marks a pioneering endeavor in Georgia. This adaptation was primarily grounded in the methodology of geographical analysis and synthesis (Beruchashvili 1986), introducing a novel approach to urban landscape planning.

2. Research methods

The article focuses on delineating the landscape functions of urban areas, serving as a foundation for landscape planning in such regions. This approach necessitates the assessment of geographical, ecological, historical, cultural, and socio-economic values inherent to urban spaces. Consequently, research across various dimensions becomes imperative. Yet, it is the geographical and ecological analysis and synthesis of urban landscapes that enable the identification of landscape functions and, ultimately, the formulation of integrated goals for landscape planning. Diverse methodologies are employed to examine the geographical features of urban landscapes (Mitz et al. 2021; Ramos, Silva 2015; Willemen et al. 2008; Křováková et al. 2015). These encompass general geographical, historical-geographical, cartographic, geo-informational, landscape analysis and synthesis, landscape planning, landscape-ecological, and social methods. In the referenced article, a blend of scientific sources and geographical landscape planning methods through field research facilitated the exploration of the urban landscape's characteristics. Landscape planning methodologies have been extensively documented in numerous papers (Sayadyan et al. 2009; Elizbarashvili et al. 2009; Protection of Landscapes, 1982), proving effective across various projects. Examples include the landscape planning of several protected areas (national parks) in Georgia

conducted between 2007 and 2020, the planning of Mtskheta's historical and urban landscape from 2014 to 2016, and the general plan of land use for the capital of Georgia, Tbilisi, in 2019, among others. As a result of our research, it became evident that developing a landscape plan at any level entails five fundamental and interrelated stages:

1. Inventory. This is the stage of obtaining and generalizing the information related to the natural environment of the territory, social-economic and ecological state and conflicts related to the use of the natural environment.
2. Evaluation. This is the stage of evaluating the natural conditions and significance and sensitivity of the potential of the landscaping area, as well as peculiarities and trends of the land use.
3. Development of branch goals. This is the stage of developing the concept of using the natural and humid (moderate humidity) components of the landscaping area as resources.
4. Development of integrated goals. This is the stage of developing an integrated concept of using a landscaping area.
5. Identification of the major trends. This is the stage of developing a concept of using a landscaping area, actions, and measures.

A geo-ecological investigation of a landscape unfolds through several critical stages, with the following deemed as most significant: landscape-ecological analysis (inventory) of the territory encompassing general geographical, landscape, social-economic, and ecological aspects, and subsequent estimation. During the general geographical analysis (Beruchashvili 1986), factors such as the geographical location of Mtskheta, area size, neighboring regions' borders, and common geographic, socio-economic, and historical-geographical features are taken into account. In the landscape analysis phase, the necessary scale for investigative purposes is determined, along with assessing the natural and urban potential of the territory. Moreover, the interplay between environmental components, fundamental aspects of structure and functioning, dynamics, and ethology (behavior) are identified.

3. Results

3.1. Types of landscape functions

Landscape functions are dynamic indicators that evolve over space and time, influenced by societal demands and ongoing natural processes and environmental issues. A prime example of this temporal variability is observed in high mountain

subalpine and alpine landscapes (Elizbarashvili, Meessen, Kohler 2018), which serve as resource-producing areas in summer and recreational destinations in winter. The fluctuation of societal needs, the quest for effective means to meet them, and the consideration of natural processes and resources must ultimately lead to the optimal utilization of landscape potential. The defined function of a landscape, along with its protection, should form the cornerstone of spatial planning. Currently, landscapes perform or have the potential to perform several key functions: The resource production function is derived from the landscape's natural-resource potential, primarily serving sectors such as mining, energy, agriculture, forestry, and water management. Landscapes with the function of restoring the environment must possess the capability to maintain structural-functional characteristics that facilitate the restoration of common components and overall landscape properties while regulating their interdependence. The function of environmental protection (nature protection) is crucial in addressing modern geo-ecological challenges, emphasizing the landscape's role in maintaining the area's sanitary, soil, and water protection significance, along with its structural characteristics that determine sustainability. Landscapes with a recreational function should exhibit high aesthetic value, contain elements essential for human health, possess cultural-historical significance and aesthetic dignity, and encompass ethno-geographical (ethno-cultural) features of the region. It is also imperative to define the urban or elite functions of the landscape, pertaining to landscapes within urban and rural settlements, industrial facilities, transportation networks, etc. Currently, urban landscapes in Georgia predominantly serve resource-producing functions. The number of landscape functions of the first type (resource production) exceeds those of the second type (environmental restoration). The former encompasses various spheres of social activity, thereby explaining the diversity of landscape functions. Consequently, the classification of the first type of functions yields distinct main groups:

1. Agro landscapes
2. Scientific-educational landscapes (protected areas, natural landscapes)
3. Recreational-aesthetic landscapes
4. Historical landscapes
5. Cultural landscapes
6. Urban landscapes
7. Landscapes required for nature protection and environmental regulation.

Landscape types often encompass multiple groups simultaneously. For instance, an agro-landscape can embody characteristics of cultural landscapes (resulting from long-term and harmonious interaction between society and nature), historical landscapes (featuring historic buildings or sites), urban landscapes (containing

settlements or industrial areas), and recreational significance. When conducting geographical analysis of such multifunctional landscapes, it is advisable to emphasize the scale of the landscape and its principal structural and functional elements.

3.2. *Functions of Landscapes of Georgia*

The transformation of natural landscapes in Georgia has been going on for millennia. The transformation of the landscape is related to its condition, potential and sustainability (Beruchashvili, Kuchlin, Zazanashvili, eds. 2000). According to these characteristics, Georgian natural landscapes currently have the following functions (Table 1).

Mtskheta stands as a unique geographical nexus. Within its confines, spanning several tens of square kilometers, converge five distinct landscape types (Plain and Hilly Subtropical Semi-arid, Plain thermo-moderate semi-humid, Hydromorphic and Sub hydromorphic, Low Mountainous Subtropical Semi-arid, Low Mountainous Thermo-Moderate Humid), alongside four historical-geographical provinces of Georgia. The geographical diversity of Mtskheta is related to several components and processes of nature, which can be considered as the main criteria for classifying landscapes:

- 4 types of relief (both plains and hills, low and medium mountains)
- types of geological structures (sedimentary and metamorphic rocks)
- 3 types of geodynamic processes (erosion, denudation and accumulation)
- 3 types of climate (humid – eastern and western parts, semi-humid – south-western, semi-arid – north and south-eastern parts)
- 3 types of soil (alluvial, steppe and mountain forest landscape soil)
- 8 types of vegetation (flood mixed forests and oak forests, oak derivatives, deciduous-oak forests, steppes, phrygana, mountain steppes and mountain meadows)
- 11 types of natural, urban, historical, cultural landscapes, with 6 of them located along the border of the urban landscape of Mtskheta.

In order to determine the functions of Mtskheta landscapes, the modern state of the landscape types, the degree of sustainability and the function are essential.

3.3. *Identification of the functions of urban Landscapes of Mtskheta*

The variety of the urban landscape of the historical capital of Georgia – Mtskheta (Fig. 1) is outstanding in Georgia, as well as in the Caucasus. 11 different landscapes

Table 1 – Functions of Landscapes of Georgia

Landscapes types of Georgia	Value of conditions for sustainable development	Value of potential for sustainable development	Value for sustainable development	Functions
1. Plain and Foothills-Hill Subtropical Humid	low	high	middle	resource – production (agro, historical, cultural), urban
2. Plain and foothills sub-Mediterranean semi-humid	middle	high	high	resource – production, (agro, historical, cultural, recreational-aesthetic), urban
3. Plain and Hilly Subtropical Semi-arid	low	high	low	resource – production (agro, cultural)
4. Plain and Foothills Subtropical Arid	middle	middle	middle	environment restorative (agro, cultural)
5. Plain thermo-moderate semi-humid	middle	high	low	environment restorative (agro, historical, cultural), Urban
6. Hydromorphic and Sub hydromorphic (river floodplain)	high	high	high	environment restorative (nature protection), urban
7. Low Mountainous Subtropical Semi-arid	low	high	middle	environment restorative, resource – production
8. Low Mountainous Subtropical Arid	middle	middle	middle	environment restorative, nature protection
9. Low Mountainous Thermo-moderate Humid	middle	high	middle	resource – production (agro), environment restorative, urban
10. Middle Mountainous Thermo-moderate Semi-humid	middle	high	middle	environment restorative (nature protection, scientific-educational), recreation
11. Middle Mountainous Thermo-moderate Semi-arid	low	high	high	recreation, resource – production (nature protection)
12. Middle Mountainous Cold-moderate	high	high	middle	recreation, resource – production, (scientific-educational)
13. High mountain alpine	high	high	middle	environment restorative, recreation, agro landscapes

Table 2 – Landscape areas, functions and planning objectives





Geographical area	Name/function	Planning purpose
	1. Historical landscape of Mtskheta (from the ancient era to the end of the 18 th century)	Conservation/improvement (due to high national, religious, historical and cultural sensitivity)
	2. Mtskheta historical landscape buffer zone (for the middle of the 19 th century)	Conservation/improvement (due to the great historical and cultural significance)
	3. Floodplain forest landscape – ramsar convention site	Conservation/development (recovery and development, prospective recreation area)
	4. The landscape of the mountains surrounding the city and the archaeological zone of Mtskheta – an archaeological site (Historical landscape)	Conservation (for scientific, educational and tourism purposes)

Table 2 – Landscape areas, functions and planning objectives (cont.)



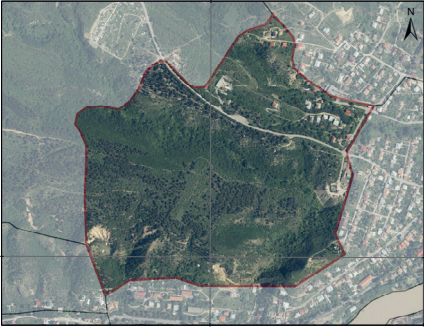
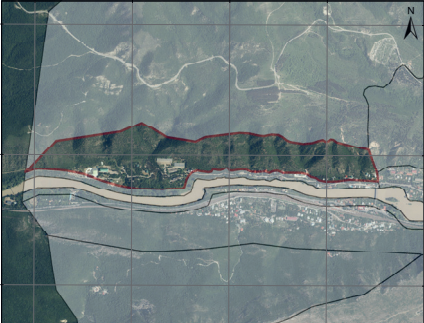
Geographical area	Name/function	Planning purpose
	5. Aragvi River former coastline (floodplain), has been degraded landscape	Improvement/development (prospective tourist-recreation area)
	6. Low-mountain landscape of the ridge surrounding the city, historical landscape of Mtskheta and environmental zone of archaeological site	Development (simple type of development zone, special anti-erosion terraces)
	7. The low-mountainous landscape of the mountain range surrounding the city, the restoration zone of the historical landscape of Mtskheta	Improvement (tourist-recreational zone, panoramic viewpoint zone)
	8. Degraded slopes near the left bank of Mtkvari river, environmental zone	Improvement

Table 2 – Landscape areas, functions and planning objectives (cont.)

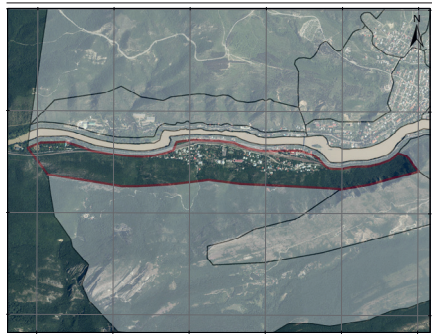
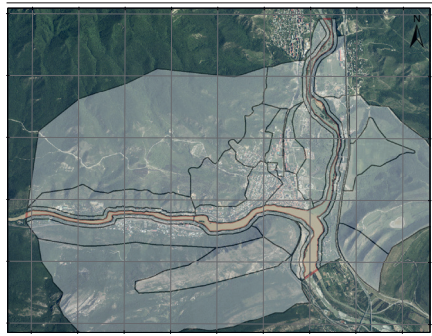
Geographical area	Name/function	Planning purpose
	<p>9. Degraded slopes near the right bank of Mtkvari River, environmental zone</p>	<p>improvement</p>
	<p>10. River Coastline of Mtkvari and Aragvi, environmental zone</p>	<p>Conservation (Protected by the Law of Georgia „On Water“), with prospects for the development of recreational facilities</p>



Figure 1 – Mtskheta and its surrounding

are spread in Mtskheta creating a unique environment. Preservation (protection) of such variability serves the purpose of demonstrating the authenticity of Mtskheta historical landscape and maintaining the Area of the urban landscape of Mtskheta.

The following basic peculiarities were considered when identifying the area of the urban landscape of Mtskheta: Biological and landscape diversity (Beruchashvili, Kuchlin, Zazanashvili, eds. 2000), Unity of the territory, Geography of material and non-material monuments, Environmental protection and esthetic functions of the landscape, Presence of geo-dynamically active areas (erosion, denudation) and the possibility of their prevention, Impact of the possible climatic change, Recreational and urban interests of the population.

Within the historical landscape of Mtskheta, taking into account the principles of landscape planning and according to legal regulations, 10 historical landscapes (main) and 7 surrounding territories (additional, prospective) planning areas are allocated.

The main units of the historical landscape of Mtskheta differ from each other in terms of their purpose, importance, current condition, scale of impact and the directions of economic measures that lead to their protection, improvement (rehabilitation) and development (Table 2).

4. Conclusion

Determining the functions of urban landscapes is a task of both scientific and practical significance. Landscaping in urban areas can yield a multitude of functionalities compared to other contexts. An urban area can encompass several functional zones, including residential, educational, historical, infrastructural, commercial, industrial (agricultural), administrative, recreational, ecological, and others. Consequently, the number of functions attributed to urban landscapes increases correspondingly. It is evident that developing methodological frameworks for defining the functions of urban landscapes is a forward-looking endeavor, necessitating the collaboration of multiple specialists. This collaborative effort involves urban planners, ecologists, historians, economists, sociologists, among others. Such a multidisciplinary approach is integral to both comprehensive urban planning initiatives and more specific spatial planning endeavors. The latter encompasses landscape planning, albeit with distinct specificities and objectives.

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Several scientific publications on the functions of urban landscapes are available (Xing, Meng 2020; Hamstead et al. 2016; Suteethorn 2009; Bedla, Halecki 2021; Matsuoka, Kaplan 2008; Willemen et al. 2008; Křováková et al. 2015). However, these publications primarily focus on the historical aspects of urban landscapes, including land use, economic zones, infrastructure, agriculture, climate, water resources, and more. It can be observed that the functions of urban landscapes are often overlooked in city planning. As a result, there is a significant gap in considering the functions of urban landscapes in both theory and practice of spatial planning. Therefore, it is crucial to prioritize the determination of urban landscape functions to enhance the efficacy of spatial planning endeavors.

The methodology for determining landscape functions, which was used for the landscape zoning and planning of the historical capital of Georgia – Mtskheta, shows that it is possible to increase the role of ecological goals and objectives in urban planning. In our opinion, in this way it will be possible to integrate and coordinate landscape planning and urban planning.

It is evident that defining urban landscape functions should consider various factors, including international experience, the country's regional development strategy, the structure and functions of natural landscapes, methodology for historical and cultural landscapes, and the interests of the local population. The Georgian landscape school has gained recognition worldwide, particularly through the works of many esteemed scientists. Professor Niko Beruchashvili's scientific legacy holds a special position within this context. His research extensively explores the spatio-temporal features of Georgia's natural landscapes, culminating in numerous monographs (Beruchashvili 1986, 1995; Beruchashvili, Kuchlin, Zazanashvili, eds. 2000). The comprehensive study of Georgia's natural landscapes, including their structure, current state, potential, dynamics, functioning, and ethology, was largely completed by the end of the last century. This body of work provides invaluable insights into the natural foundations of various landscape types, the extent of human-induced transformation, and potential utilization opportunities. Georgia's ongoing integration process with the European Union necessitates spatial planning, decentralization, and active engagement of the local population. Additionally, plans to nominate several areas of international significance and cultural heritage to UNESCO underscore the importance of

sustainable development principles. Achieving a sustainable ecological situation requires ecologically oriented planning of natural, urban, historical, and cultural landscapes. Consequently, studying the structure, potential, sustainability, and functions of all types and forms of landscapes assumes paramount importance in this endeavor.

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