ICONARP
International Journal of Architecture and Planning
Received: 13.08.2022 Accepted: 23.09.2022
Volume 10, Issue 2/ Published: 20.12.2022
DOI: 10.15320/ICONARP.2022.217 E- ISSN:2147-9380
Research Article
ICONARP

What Fundamental Indicators Should Be Used to Measure the Change in the Historic Urban Landscape Approach?

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Abstract

Historic Urban Landscape (HUL) identifies an urban area due to its cultural and natural values and the qualities of its historical plane. Within this context, this article aims to determine and categorize these values used in the HUL approach as indicators. The research question focuses on finding specific indicators used in the HUL approach to measuring change beyond considering natural and cultural heritage values in the landscape context. These indicators in 228 peer-reviewed publications implementing the HUL from 2008 to 2021 are assessed. The six-step inclusive and exclusive theoretical framework is established as a method in this article to detect the inadequate implementations of HUL in case studies. The initial finding of this article is that the adequacy of using the HUL approach in publications is questionable as the implementation of the HUL approach processes was incomplete or misunderstood in most of them. Only 29 articles of the 228 publications implemented the HUL approach in its entirety. The other finding is that when the change measurement indicators in the HUL approach are examined, it is evident that natural indicators were the least used group compared to cultural and identity indicators. Each cultural, natural, and identity indicator group should be utilized evenly to implement the HUL approach adequately. This article presents a fundamental indicator list that includes cultural, natural, and identity groups for correctly using the HUL approach.

Keywords:
Heritage indicators, historic urban landscape, landscape context, limits of change

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To cite this article: Koyunoglu, A.B., & Zeren Gülersoy, N. (2022). What Fundamental Indicators Should Be Used to Measure the Change in the Historic Urban Landscape Approach?. *ICONARP International Journal of Architecture and Planning,* 10 (2), 596-613. DOI: 10.15320/ICONARP.2022.217

INTRODUCTION

The landscape is an archive of layers of the history of interaction between humankind and nature. The meaning of landscape refers to the natural and cultural characteristics of an area as a whole. The definition of the landscape can have diverse meanings in different languages, disciplines, and approaches. "Landscape" is the instruments and processes of identification, conservation, and promotion of outstanding cultural heritage sites with an integrative cross-border in the European Landscape Convention (EU, 2000). This convention provided collective and holistic content in the landscape context. This content has induced the landscape to be considered a tool in conservation studies to make cultural, natural, and identity studies together.

According to an area's natural and cultural characteristics, the landscape can be examined in two subtopics: natural and cultural landscapes. The natural landscape consists of a collection of landforms not created by humans: forestlands, wetlands, mountains, vegetation such as tundra, mangroves, and all topography.

Different disciplines, including geographers, conservation organisations, and historians, define the cultural landscape. In UNESCO's World Heritage Cultural Landscapes 1992 publication, "cultural landscape" represents the change in human society and settlements throughout time and recognised characteristics (UNESCO, 1992). The term cultural landscape refers to a complex and productive concept that includes the physical environment and the cultural and social meanings that create a sense of belonging to a place. The cultural landscape was also considered the tangible reflection of human practices, needs, and beliefs related to the natural landscape and was regarded as an essential factor in ensuring the continuity of daily life (Melnick, 1984; Fowler, 2003).

UNESCO also defined the concept of the cultural landscape as the reflection of the joint work of nature and humankind (1992). Cultural landscapes are formed according to the mutual interaction between culture and nature that shapes the physical environment and includes a contemporary landscape. The cultural landscape consists of three main categories: "Human designed and created landscapes," "organically evolved landscapes," and "associative cultural landscapes" (UNESCO, 2008). Human-designed and created landscapes are samples of urban landscape configurations on various scales, from historic settlements to small formal gardens. An organically evolved landscape mainly refers to rural aspects of cultural landscapes. Associative cultural landscape refers to indigenous tracks on the landscape and historical and spiritual interpretations of landscapes.

After establishing the cultural landscape context in conservation literature in 2011, the Historic Urban Landscape (HUL) approach introduced the urban landscape as a conservation tool in historic environments (Martinez, 2017; Von Oers, 2014; UNESCO, 2011). It reconceptualised the urban landscape as a dynamic complex

DOI: 10.15320/ICONARP.2022.217

environment where "change can occur at different intervals and levels and with different magnitudes" (Bandarin & Von Oers, 2012, p. 143). HUL, therefore, consists of an evolving system that changes over time, including multi-dimensional indicators that define the layers of a landscape.

The inadequacy of conservation approaches against the dynamism of the historic urban environments led to reconsidering the conservation methodologies to adapt them to the rapidly changing elements in the urban context (Rodwell, 2018). Therefore, urban conservation through change management has become an essential topic in natural and cultural conservation (Yang et al., 2019; Martinez, 2017). The challenge was to sustain authenticity by establishing "the limits of change" or "the level of acceptable change" according to heritage values (Bandarin & Von Oers, 2012). These discussions led to the emergence of new landscape conservation content where historic urban landscapes with a comprehensive approach to natural, cultural, intangible, and historic heritage became crucial to establish the limits of acceptable change.

Consequently, in 2010, UNESCO proposed the urban landscape approach, which was used to define, protect, and manage historic urban areas and determine their values (2010). The urban landscape approach should be extended to cover a much broader context that includes physical forms and their interactions, spatial organisation, natural features, and their relationship with the development of the settlement type, as well as cultural and social values. Later in 2011, UNESCO defined the concept of HUL as a historical layering of cultural and natural values and attributes. This definition included the natural attributes of the city, such as its topography, geomorphology, and hydrology; the historic and modern settlements; the infrastructure above and below ground; the open areas and gardens; the methods of land use and area organisation; the perceptions and visual relations, and all other elements of the urban structure (UNESCO, 2011, Article 9).

This article evaluates HUL literature based on the indicators used to measure the change in the historic urban environment. Landscape content in the literature was first analysed to determine the HUL approach indicators. Secondly, research involving case studies was systematically analysed to categorise the indicators. Then, distribution analyses of these indicators were made according to the HUL steps followed by the researchers and their research objectives. Finally, the indicators used to measure changes in the HUL approach implementation were listed. The methodology of the articles is constructed on a six-step inclusive and exclusive theoretical framework that is utilised to eliminate inadequate publications for this article. As a result, this article proposes a fundamental data set to understand the historic city's landscape as defined in the HUL Recommendation.

ICONARP – Volume 10, Issue 2 / Published: 20.12.2022

EXAMINING THE CONTENT OF THE HISTORIC URBAN LANDSCAPE APPROACH FOR MEASURING CHANGE

Particular articles in the HUL Recommendation are a continuation of earlier historic urban conservation approaches, while others describe the original nature of this approach. Articles that are a continuation of the earlier historic urban conservation approach emphasise the natural and cultural heritage connection and the importance of geographical setting. Article 5, which is based on the relational principle among the physical forms of the urban contexts, mentions "the spatial organisation and connection, their natural features and settings, and their social, cultural and economic values." It suggests searching for creative combinations of different landscape forms to activate new urban dynamics (UNESCO, 2011). Additionally, Article 8 defines the historic urban landscape as a metropolitan area that is the result of a historical layering of cultural and natural values and attributes which extend beyond the notion of a "historical centre" or "ensemble" (UNESCO, 2011).

These descriptions indicate that the requirements of the broader urban context and geographical settings should be considered in conservation practices. Tryzna mentions the necessity of considering natural and cultural components and the broad content defined for conservation together (2017). For this integration, joint studies of ICOMOS and IUCN were started. These collaborative studies aim to define new methods and strategies for recognising and supporting the corresponding character of landscapes' natural, cultural, and social value (IUCN & ICOMOS, 2017). This joint study also supports the ideas of the Urban Protected Areas Guide, which states that the conservation of natural heritage in cities can only be maintained by including cultural aspects of urban areas (Edmiston et al., 2014). Based on their characteristics and status, natural areas should be made accessible for daily usage to integrate cultural aspects (Edmiston et al., 2014). With this access, the interconnected nature of the urban landscape is demonstrated to conserve natural areas, and these areas have become more adaptable to change.

The original nature of the HUL approach is that it focuses on change and the management of change. This change is emphasised in Article 11 of the Recommendation to preserve "the quality of the human environment, enhancing the productive and sustainable use of urban spaces, while recognising their dynamic character, and promoting social and functional diversity" (UNESCO, 2011). To Article 26 of the Recommendation, it is inevitable "to document the state of urban areas and their evolution, facilitate the evaluation of proposals for change, and improve protective and managerial skills and procedures" (UNESCO, 2011). The skills to document the state and the evolution of a historic environment and determine the indicators that serve to comprehend landscape context became the main objectives of a guideline published after the Recommendation (WHL & UNESCO, 2019). Theoretical

DOI: 10.15320/ICONARP.2022.217

research and case studies were included in this guideline. The guideline is an essential reference for researchers to utilise the HUL approach.

ANALYSING THE HUL IMPLEMENTATION PROCESS WITH THE SELECTED CASE STUDIES

After the HUL approach was adopted, more research was used to examine its implementation. This part of the article focuses on content analysis of the HUL, primarily on the theoretical categorisation of indicators used in case studies. Content analysis was utilised to organise and elicit meaning from the data collected from HUL-related topics and to draw realistic conclusions from it (Bengtsson, 2016). Given the innovative and flexible nature of the HUL approach, this categorisation aims to reveal and discuss how indicators are adopted in this approach.

A systematic evaluation of peer-reviewed publications was analysed in international journals between 2008- 2021 to categorise the HUL indicators available in databases such as Scopus and Google Scholar. The term HUL started to be published in 2008 within the scope of the content discussed in this article. By searching for "Historic Urban Landscape" in titles, abstracts, and keywords, 322 potential publications were identified. Repetition in publications was removed, leaving 228 publications. A theoretical framework for elimination was constructed for the aim of this article. According to this elimination methodology, six inclusion and exclusion criteria were applied to the publications. The first criterion references "historic urban landscape" in the title, abstract, and keywords. The second is online accessibility, either open source or accessible through the İstanbul Technical University network. The third criterion excludes books without an academic index or conference proceedings and includes peer-reviewed journals and scholarly book chapters. The fourth criterion is to be written in English. The fifth is to have a case study in the research. The last criterion concerns applying the HUL approach and its competence. Therefore, publications that misused the HUL approach were excluded.

Similar studies were encountered while conducting a literature review and establishing the methodology. For the inclusion and exclusion criteria determination, Rey Perez and Pereira Roders' elimination methodology provided valuable insight for this article (2020). Similarly, the inclusion/exclusion criteria were determined in both studies. However, since the objectives of both studies are different, the content of each criterion is also different. Firstly, this study's elimination methodology is utilised whether HUL implementation includes a case study. If it consists of a case study, the aim is to analyse whether cultural, natural, and identity indicators were used in case studies or not. In addition to these two differences, the interval in which the literature review was conducted is also different. After applying the first four inclusion-exclusion criteria, 169 articles out of 228 publications remain.

ICONARP – Volume 10, Issue 2 / Published: 20.12.2022

The remaining publications were subjected to another elimination to see if a case study had covered them. Eighty-nine publications include case studies (the fifth criterion). Of these 89 publications, 29 included relevant HUL research and understood the HUL approach. Some excluded publications have case study implementations similar to the HUL approach but no reference to the Recommendation (Taha, 2014; Siravo, 2015). Some correctly refer to the HUL approach, but their focus shifted in the implementation phase (Psarra, 2018; De Medici et al., 2018; Berg, 2018; Moertiningsih et al., 2020; Garau, 2020; Hussein et al., 2020; Dhingra & Chattopadhyay, 2021; Kashihara, 2021; Klingmann, 2021; Giuliani et al., 2021). The 29 remaining publications reference the Recommendation, comprehend the approach, implement it in some cases, and develop proposals to improve implementation. After the determination of 29 publications, each publication was reviewed according to an implementation process described within the HUL approach. This process is summarised in six steps: mapping, consensus, vulnerability, integration, prioritisation, and partnership (Bandarin, 2014; Rey Perez & Pereira Roders, 2020; Pintossi et al., 2021 a; Pintossi et al., 2021 b).

The implementation of the six-step process in the HUL approach is analysed for the 29 remaining publications. The first "mapping" and third "vulnerability" steps are examined separately because, in these steps, case studies are analysed for spatial change. "Mapping" overlays natural, cultural, and social resources. "Mapping" assists researchers in combining and interpreting distinct heritage resources. The third step, "vulnerability," is used to determine changes and the reasons that trigger the changes. The first step of the HUL, "mapping", was not applied to 6 case studies (Bonadei et al., 2017; Ji et al., 2020; Muminovi et al., 2020; Pintossi et al., 2021a; Pintossi et al., 2021b). The third step, "vulnerability," was not implemented in 2 case studies (Yang et al., 2019; Ji et al., 2020). The third step, "vulnerability," is the most applied. This distribution within the steps may indicate that the HUL approach is used to understand "limited change," as emphasised.

After understanding the distribution of the six-step process of the HUL approach among case studies, the publications that implement the first and third steps were selected for the subsequent analysis of this article. Thus, it was ensured that all the remaining publications had done at least one case study and represented a measurement of change. 21 out of 29 publications remain. The remaining 21 publications have distinct research aims implementing the HUL approach in 29 case studies. According to these specific research aims, these publications address various natural, cultural, and identity indicators on different scales.

DOI: 10.15320/ICONARP.2022.217

ANALYSING HUL INDICATORS ACCORDING TO SELECTED CASE STUDIES

The HUL approach has a flexible and innovative implementation process for distinct scales with different contents. The use of indicators differs in most publications due to this flexible process. However, the HUL Recommendation has stated some fundamental indicators that need to be included to measure spatial transformation in a historic environment (UNESCO, 2011). Buildings, building groups, and transportation networks are defined as the form of the urban landscape. Intangible and tangible cultural values comprise the identity of the urban landscape. Flora and fauna constitute biotic features. Topography, hydrology, and climate data include abiotic components. These abiotic and biotic features define the ecology of the historic urban landscape (Von Oers, 2014).

This article has reviewed the indicator lists used in the case studies of 21 publications that correctly implement HUL in Table 1. This review is aimed to see that cultural, natural, and identity indicators are included in the process evenly, as stated in the HUL Recommendation. Wang and their colleagues focus on the ancient city wall in Xian, China (2019). Therefore, its list of indicators is limited to cultural data according to this site-specific context. Like Wang, Margottini has utilised the HUL approach on the remnants of different ancient cities in the World Heritage List (2015). The list of indicators is mainly gathered from each ancient city's cultural and topographic aspects. Another similar study is Shin and their colleagues' publication (2015). It focuses on the change in the Gwanghalluwon Garden in Namwon, Korea (Shin, 2015). These aim-specific HUL implementations do not necessarily focus on measuring all indicators' changes. They eliminate unnecessary indicators and design their indicator lists specific to their aim. Nevertheless, they still measure change and indicate conservation priorities according to the HUL approach.

Hill and Tanaka's publication focuses on a historic street in the Havana District, Cuba (2016). This research aims to analyse the effect of two different regimes in Cuba on the historical street structure and dwellers. Therefore, instead of mapping cultural, natural, and identity indicators, the researchers focus on collecting traditional practices such as special hair salons, haircutting, street vendors, or other folkloric traditions. They conduct interviews and attempt to establish a spatial relation out of these interviews. Another compelling study is Kudumovic's research in Bosnia Herzegovina, focusing on Tesanj and Vranduk towns in the Valley of Bosna River (2015). Kudumovic analysed two towns by comparing their conservation status and the factors affecting heritage conservation. The researcher proposes a conservation approach to evaluate the valley as a single cultural, historical and geographical area due to the similarities of the valley's towns (Kudumovic, 2015). Therefore, it suggests utilising the HUL approach to expand the conservation area and its vision to a valley scale by considering the entire valley instead of applying it to individual historic towns. Rather than measuring the change with indicators, the research tried to bring a perspective on conservation, so case studies

were completed on observations of monumental structures. Other studies use the HUL approach uniquely, such as Carone and his/her colleagues' research, which focuses on the metropolitan area of Naples, Italy (2017). They utilise the HUL approach with Health Impact Assessment (HIA) to examine the issues that affect individual and collective well-being and health. Therefore, they assess a specific set of indicators as a determinant of health, such as biological factors (age, gender), family and personal background, public services, and social events.

The status of the three indicator groups that should be used in the HUL approach was examined according to 29 case studies in 21 publications. Three different usage statuses were identified in Figure 1. These statuses are named "included," "excluded," and "partially included." According to this analysis, all 29 case studies included cultural indicators. Identity indicators were used in 18 case studies. One of the case studies was partially included in the identity group analysis. Partial inclusion in the identity indicator group is because the publications only make observations and evaluations. When natural indicators were examined, it was revealed that they were used only in 17 case studies. In three case studies, natural indicators are included partially. Natural indicators were not analysed in 9 case studies. According to Figure 1, the least applied indicator group in these 29 case studies is the natural indicator group.

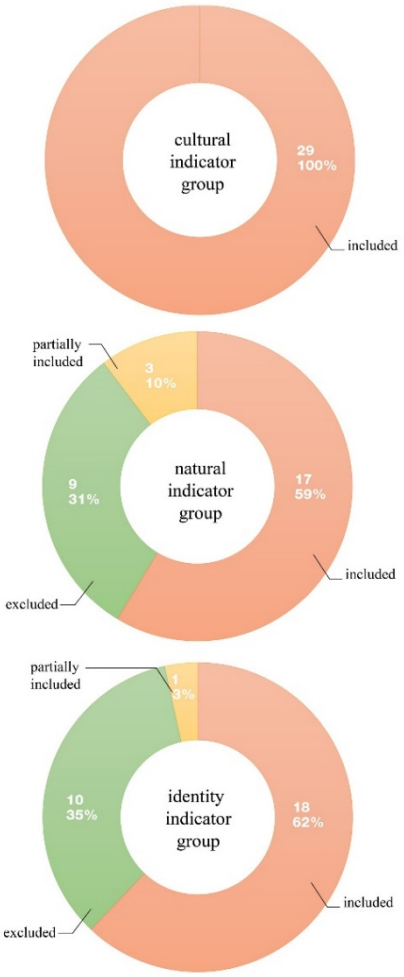

Figure 1. Inclusion of HUL indicator groups according to case studies.
The status of the three indicator groups that should be used in the HUL approach was examined according to 29 case studies in 21 publications.

DOI: 10.15320/ICONARP.2022.217

Table 1a. The list of indicators used in case studies

1	Case study Info	Oumelkheir & Nadia (2021)
	Cultural Indicators	Urban fabric, historical paths, traditional city border, architectural monuments, city walls, historic gardens
	Natural Indicators	Natural coastline, topography, protected areas
	Identity Indicators	Beauty configurations
	Content	Evaluation of a waterfront city evolution focusing on the development pattern
	Scale	City
2	Case study Info	Kırmızı & Karaman (2021)
	Cultural Indicators	Monuments, road network, land-use pattern
	Natural Indicators	Air pollution, natural disasters, green areas
	Identity Indicators	A participatory approach among stakeholders and administrative bodies
	Content	Understanding spatial transformation of the historic port area and its surrounding
	Scale	Site/ historic port
3	Case study Info	Wang & Gu (2020)
	Cultural Indicators	Historic walls, traditional courtyards, modern buildings, grid street system, land-use pattern, city-wall park
	Natural Indicators	Vegetative cover
	Identity Indicators	Observation of the displacement of residents
	Content	Measuring historic city centre transformation focusing on walled settlement and its surrounding
	Scale	Site / historic city centre
4	Case study Info	Rey Perez & Dominguez Ruiz (2020)
	Cultural Indicators	Administrative boundaries, characteristic rural architecture, monuments, archaeological and ethnographic heritage, road networks, land-use patterns, typological studies, historical irrigation systems
	Natural Indicators	Geomorphology, geology, hydrology, environmental study, contour lines, flora and fauna, hydrography, geo-ecological and livestock potential, protected natural spaces, landscape units
	Identity Indicators	Religious, cultural, and gastronomic rites, intangible heritage study, census of empty houses and housing in ruins
	Content	Assessing rural historic settlement heritage management focusing on diverse stakeholders' involvement
	Scale	Site / historic city centre
5	Case study Info	Colavitti & Serra (2020)
	Cultural Indicators	The restricted historic centre, residential areas, services, road network, civil and religious hubs, garden walls, gates on the street, typologies of courtyards, urban morphology, courtyard typologies, gardens
	Natural Indicators	Courtyard's vegetation
	Identity Indicators	-
	Content	Historic rural town centre transformation analysis
	Scale	Site / historic city centre
6	Case study Info	Wang et al. (2019)
	Cultural Indicators	City wall, urban historical and cultural heritage conservation, construction data sets, land-use, gates, urban road systems, space composition, axis relationships
	Natural Indicators	Green belt park, geographical features, natural environment data observations
	Identity Indicators	Archives, local chronicles, yearbooks, publications, memoirs, new materials, maps, conferences records, historical photos, observation of the relationship between social activities and public space, observation of the relationship between historical heritage and urban public space
	Content	Retrospective spatial transformation in a historic city centre focusing on the ancient city wall.
	Scale	Site / historic city centre

ICONARP – Volume 10, Issue 2 / Published: 20.12.2022

Table 1b. The list of indicators used in case studies (continue)

7	Case study Info	Fabbricatti & Biancamano (2019)
	Cultural Indicators	Heritage sites, security and land management, infrastructure services, energy and waste, agricultural and floricultural sectors
	Natural Indicators	Geographical characteristics, protected green areas
	Identity Indicators	Local economic growth, economic and commercial vitality, attractiveness, demographic structure, collaborative resource management, civic commitment
	Content	Life quality, real estate, and spatial change in a city that has heritage value, quality of the built environment
	Scale	City
8	Case study Info	Rey Perez & Valencia Avellan (2018)
	Cultural Indicators	Waterfront land use, the materiality of the facilities and streets, infrastructure, consolidation of neighbourhoods, landmarks, monuments, cultural and recreational uses, regulatory issues, governmental aspects
	Natural Indicators	Waterfront, natural values (river and hills), vegetation
	Identity Indicators	Intangible heritage, economic productive and cultural-social activities, urban image
	Content	Development impacts on the historic waterfront boulevard of the city
	Scale	City
9	Case study Info	Yan (2018)
	Cultural Indicators	Boundaries of the site, buffer zone, historic buildings and their gardens, historic sites and structures, cultural relics, historical road networks, public service facilities, industrial and commercial facilities, well-preserved residential buildings
	Natural Indicators	Significant topography (7 hills), visual landscape relations, natural landscape, essential landscape elements
	Identity Indicators	Cravings, inscriptions, religious, social, and art groups; residents, local celebrations and festivals, construction skills
	Content	The retrospective spatial analysis primarily focuses on urban morphology.
	Scale	Site/ historic island settlement
10	Case study Info	Rey Perez & Martinez (2018)
	Cultural Indicators	Institutional transformation, governmental organisations, and strategic guidelines focus on development, infrastructure, planning, housing facilities, public transportation, and declared heritage areas.
	Natural Indicators	Lake, gardens, fresh air, green spaces, proximity to nature, sound, smell, views, lookouts, significant trees
	Identity Indicators	Sense of community, safety, community feel, friendliness, generosity, culture-access to music and arts, markets, gastronomy, handicrafts, traditional clothing
	Content	Analysing HUL implementation and comparison with Ballarat and Cuenca cases
	Scale	City
11	Case study Info	Rey Perez & Siguencia Avila (2017)
	Cultural Indicators	City structure, historic cartographic study, regulatory systems, heritage studies, categories of built heritage, architectural typologies
	Natural Indicators	The natural landscape, territorial components
	Identity Indicators	Economic activities, perception analysis from the citizenship participation workshops
	Content	Retrospective spatial analysis
	Scale	City

DOI: 10.15320/ICONARP.2022.217

Table 1c. The list of indicators used in case studies (continue)

12	Case study Info	Verdini et al. (2017)
	Cultural Indicators	Cycling routes, commercial developments, heritage conservation areas, new housing development, proposed bridge, decorative rose garden, rose cultivation area, and agricultural activities.
	Natural Indicators	Green road, preserved fishponds
	Identity Indicators	Interviews with decision-makers, cultural mapping with local inhabitants, residential workshops
	Content	Spatial change analysis focusing on participatory practices
	Scale	Site /historic city centre
13	Case study Info	Carone et al. (2017)
	Cultural Indicators	Public safety, design of urban space, transportation, land use, waste disposal, accessibility to public services, environmental health, and quality of house and workplace
	Natural Indicators	Balance of built and natural landscape
	Identity Indicators	Age, gender, nutritional factors, family structure, education, employment, risk behaviour, physical activity, conflicts between different interests, cultural groups, discrimination, social support, participation in cultural and spiritual life, public policy
	Content	Health and spatial change analysis
	Scale	City
14	Case study Info	Siguencia & Rey Perez (2016)
	Cultural Indicators	Urban planning, historic cartography analysis, land uses.
	Natural Indicators	Geomorphology, vegetation, hydrology
	Identity Indicators	Symbolic and iconic images of the city
	Content	Developing an integrated tool in heritage conservation
	Scale	City
15	Case study Info	Murphy et al. (2016)
	Cultural Indicators	Community services and infrastructure, regulatory tools, boundaries, land-use patterns, cultural landscape
	Natural Indicators	Hydrology, ecology, geology, topography
	Identity Indicators	Points of interest, community values
	Content	Indigenous and colonial period analysis
	Scale	City
16	Case study Info	Buckley et al. (2016)
	Cultural Indicators	Cultural mapping of streets, places, and cultural features
	Natural Indicators	Natural features
	Identity Indicators	Needs of walkers and drivers
	Content	Discussing the managerial efficiency for better implementations
	Scale	City
17	Case study Info	Hill & Tanaka (2016)
	Cultural Indicators	Architectural heritage, streets, plazas, infrastructure, changes in the names of developments
	Natural Indicators	-
	Identity Indicators	Art of haircutting, street vendors, artisans, book vendors, street artists, taxis, drivers, musicians, folkloric groups, self-employed workers
	Content	Historic streetscape spatial change according to regime changes
	Scale	Site/historic streetscape

ICONARP – Volume 10, Issue 2 / Published: 20.12.2022

Table 1d. The list of indicators used in case studies (continue)

18	Case study Info	Margottini (2015)
	Cultural Indicators	wooden buried fence, wooden check dam, stone check dam, stone and wooden check dam, open water channel, buried pipe, retention pool, maintenance hole, stone channel, wall, drainage network, remains, paths, vegetative fencing
	Natural Indicators	-
	Identity Indicators	-
	Content	Ancient city centre's conservation status and their spatial analysis
	Scale	Site / historic city centre
19	Case study Info	Sil Shin et al. (2015)
	Cultural Indicators	Road network, relation to central district and residential area
	Natural Indicators	Hydrology, green areas, lawn area, vegetation covers, silhouette
	Identity Indicators	The popularity of the garden
	Content	Historic garden retrospective spatial change analysis
	Scale	Site / historic garden
20	Case study Info	Kudumovic (2015)
	Cultural Indicators	Administrative boundaries, state of conservation, monumental buildings, protection zones
	Natural Indicators	Residential areas with unique natural settings - topographic evaluations
	Identity Indicators	-
	Content	Ottoman and Byzantine period comparison
	Scale	Site/ historic valley settlement
21	Case study Info	De Rosa & Di Palma (2013)
	Cultural Indicators	Institutional organisations, cultural organisations, cultural events, heritage sites, recycling, regeneration
	Natural Indicators	CO2 emission, water material recovery, green spaces
	Identity Indicators	Employment ratio, ethnicity, crime, festivals, celebrations in a year, business count, tourists port flows, funds for the cultural heritage, national and international awards for virtuous policies
	Content	Climate change resilience
	Scale	Site/ historic port

THE FUNDAMENTAL INDICATORS FOR MEASURING CHANGE WITH THE HUL

This article aimed to determine fundamental indicators of the HUL approach to measuring the change in the historic urban environment. According to analyses, the cultural, natural, and identity indicator groups differ in line with the scale and content of the research. However, if the intention is to conduct a case study within the scope of the HUL approach, the indicators in these three groups should be considered evenly. When these three groups are not considered together, it is impossible to reach the scope targeted by the HUL approach with the term landscape. A list of suggested fundamental indicators that can be used in case studies with different scales and contents has been created to reach this landscape scope (Table 2). While creating this list, 21 publications that correctly use the HUL approach were referenced to develop the indicator grouping specified in the HUL Recommendation.

DOI: 10.15320/ICONARP.2022.217

The three indicator groups in this proposed fundamental list are detailed with spatial data indicators. Cultural, natural, and identity indicators establish spatial datasets in the historic urban environment. These three indicators enable us to understand the historic urban environment in landscape content. The analyses conducted in this article determined that the least used group among the indicator groups was natural indicators. There may be two reasons for this result. The first reason is that the researchers who analyse the change using the HUL approach focus on cultural and identity data. Understanding the necessity of using landscape content in conservation applications is essential because natural and cultural data have an equal impact on shaping historic urban environments. The second reason may be the lack of integration of studies in analysing cultural and natural heritage data. To rectify this situation, studies that will enable standard heritage analyses, such as "CultureNature Journey," have been initiated with the joint coordination of ICOMOS and IUCN. With these studies, the HUL approach will be developed, allowing the holistic analysis of the natural, cultural, and identity data that shape historic settlements.

Table 2. Proposed Fundamental Indicator List for the HUL Approach Implementation

Cultural Indicators	Regulatory systems	political boundaries, conservation areas and buffers
	Infrastructure	roads and routes, sewage systems, electric and high-power lanes, piers, bus stops
	Built environment	residential, commercial, industrial, educational, military, public/civic, mixed-used
	Historic environment	the historic centre, historic and listed buildings
	Green areas	recreational areas, cemeteries, parks and green areas, sports facilities
	Production	orchards, nurseries, urban farming areas and hobby gardens
Natural Indicators	Abiotic	topography, slope, aspect, geology, shoreline, hydrology
	Biotic	natural vegetation, folkloric activities
Identity Indicators	Socio-cultural practices	traditional practices, economic activities, vendors
	Memory	events, festivals, cultural activities, tales, narratives, points of interest, images of the city, perception, photos in personal archives
	Demography	population and population density, income, education level

CONCLUSIONS

It has been understood that the data sets that make up the indicator groups can differ according to the content and purpose of the research, even if they are considered evenly. The diversity of these data sets proves the flexibility and adaptability of the HUL approach according to the case study and purpose under consideration. It is thought that this flexibility and adaptability in the HUL approach allows us to bring together the authentic heritage values specific to each case study. This flexibility also offers the opportunity to adapt the conservation content in the HUL to case studies with different purposes, such as quality of life, climate crises, or resilience.

The case studies analysed in the literature do not focus equally on natural, cultural, and identity components as defined in the HUL approach. The first finding of the research is that the most studied

component group in the case studies is cultural components. Another result is that the identity component group is less studied than the cultural component group. It was determined that the least examined group within the scope was natural components. With these findings, it has been concluded that the natural and identity indicators are not as focused as the cultural components in the case studies made within the scope of the HUL approach. The need for a primary data list has been identified to ensure that all indicators are examined in the case studies carried out within the scope of the HUL approach. A list of fundamental indicators that should be analysed was created in this research to meet this need.

After the publication of the HUL Recommendation in 2011, the main initiatives were led by UNESCO (The United Nations Educational, Scientific and Cultural Organization) and WHITRAP (World Heritage Institute of Training and Research for the Asia and the Pacific Region under the auspices of UNESCO). UNESCO's headquarters is in Europe, and WHITRAP's is in China; therefore, most case studies are located in these regions. It is necessary to establish open-access databases that include geo-referenced historical, past, and present studies of natural, cultural, and identity indicators to broaden the case studies. Thus, not only local administrative bodies or institutes implement the HUL approach, but non-governmental organisations, the private sector, or other individual professionals could also have the opportunity to access indicators and implement the HUL approach.

The HUL approach should be associated with the impact assessment studies in Turkiye. With this association, the reason for vulnerability in conservation can be addressed holistically. The change in the indicators of the HUL approach should be interpreted with urban dynamics and used in determining priorities in heritage conservation, site management, and planning practices. It is also evidently important to include professionals who can use landscape tools that can integrate cultural, natural, and identity data in the conservation and planning processes in the Turkiye applications.

ACKNOWLEDGEMENTS/NOTES

This article is an excerpt from a part of A. Balin Koyunoğlu's PhD dissertation titled "Tarihi Kentsel Peyzaj Yaklaşımı ile Doğal Ve Tarihi Çevre Değişiminin Ölçümü için Bir Model Önerisi: İstanbul Boğaziçi Sit Alanı Örneği," supervised by Professor Nuran Zeren Gulersoy at Istanbul Technical University.

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Resume

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DOI: 10.15320/ICONARP.2022.217