

INFLUENCE OF SOUNDMARKS IN CREATING THE SENSE OF PLACE IN URBAN LANDSCAPE DESIGN OF PUBLIC SPACES

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Abstract: Sri Lanka's rapid urbanization has led to the transformation of public spaces, particularly in Colombo, to improve city living and aesthetics. However, the current state of public spaces is characterized by monotonous landscape developments, with a focus on visual quality and limited consideration of auditory aspects. This study on soundscapes aim to address this gap by identifying soundmarks that provide unique and recognizable qualities for spaces. The research questions include how soundscapes can contribute to avoiding monotony in urban public spaces, identifying existing soundmarks, analyzing spatial arrangement, and developing guidelines for integrating soundmarks in landscape design. The research objectives include understanding the impact of soundscape on the quality of urban public spaces, identifying existing soundmarks, analyzing spatial arrangement, and relating social relationships of users to the various aspects of soundscape in urban public spaces. The study will use methods such as soundwalking and user interviews to explore the multimodal observation of the urban environment, incorporating visual and sonic cues.

Keywords: *Soundscape, Soundmarks, Sense of Place, Urban Public Space, Landscape Design*

1. Introduction

Since the cease of civil war, Sri Lanka has been heading towards rapid urbanization. Improvement of landscapes with increased visual image is an identifiable trend in the ongoing development process in main townships, in an attempt to improve the quality of city living. This has resulted in the transformation of many public spaces, especially across the Colombo urban area in terms of;

- Regeneration and beautification of public areas
- Melioration of facilities and infrastructure
- Improving city image

1.1. RESEARCH GAP

However, it is observed that these developments with typical additions to the landscape- seating, urban vegetation, and generalized functions, have currently resulted in a series of monotonous landscape developments, which has led to the current condition of public spaces with "improved aesthetics with common character". Thus, further study is important to develop better landscaped spaces with unique characters for variety of experiences. Whilst, aesthetics, functionality, accessibility, sensory experience, engagement, and interaction are ways by which the quality of space could be improved; the sensory qualities of a landscape, including sounds, smells, and tactile elements, can significantly impact its experiential value. Most research in this area, however, has been concentrated on visual quality, and work on the auditory aspect is limited. Soundscape may also contain special soundmarks that provide the place with unique and recognizable qualities and social value. Just as much as landmarks account for the individuality of space visually, soundmarks although intangible account for the same acoustically. 'Soundmark' is a term derived from 'landmark' used in soundscape studies to refer to a community sound that is unique, or possesses qualities that make it specially regarded or noticed by the people in that community. The research question thereby considering the gap in research, promotes further analysis; of the area of soundscapes with special consideration to soundmarks, in an approach to improving the quality of Urban public spaces

1.2. RESEARCH QUESTIONS AND OBJECTIVES

In this aspect, two key questions need to be answered.

How can the soundscape contribute to avoid the monotony of landscapes by enhancing the sense of a place, through the identification of soundmarks? How then can soundmarks be utilized effectively to enhance the sense of a place through its proper incorporation in landscape design?

- Understand the impact of soundscape on the quality of an Urban Public Space.

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DOI: <https://doi.org/10.31705/FARU.2024.3>

- Understand the criteria to identify and define a soundmark, and accordingly, analyze and identify existing soundmarks within urban public spaces. (By means of case studies)
- Analyzing the spatial arrangement of soundmarks and relate social relationships of users to the various aspects of soundscape in urban public spaces.
- Develop guidelines and recommendations for integrating soundmarks in public space landscape design to avoid monotony.

1.3. LIMITATIONS AND SCOPE OF STUDY

Sound perception is highly subjective. Capturing and quantifying the subjective experience of soundmarks was difficult. Adding on to subjectivity are the demographical factors leading to different hearing capacities. To address this issue, although an age limit could have been set for the respondents, the study of sense of place and soundmarks includes partly the aspect of evolution and historic preservation, hence requires the contribution of the elderly community. Therefore, age was neglected however, hearing disabilities were considered and responses disregarded to avoid major discrepancies in the data. Further, associated with temporal variations, soundscapes become highly dynamic. Changes occur over time due to factors like urban development, technological advancements, or changes in cultural and political practices. This makes it challenging to study soundmarks as fully stable entities. However, since soundmarks must be one that's permanent, requiring consistency or at least periodic consistence, seasonal changes such as monsoonal effects on sounds, changing wind patterns over seasons as well as seasonal human activities have not been accounted in the study. Seasonal soundmarks however could be a new area of study for future research, to be conducted over a period of considerable time. Adding on to this is the absence of a standardized methodology for identifying, documenting, and evaluating soundmarks. This can lead to inconsistencies in the research approaches. Despite these limitations, research on soundmarks remains an important field for understanding the sonic identity of places and the impact of soundscapes on the well-being of communities. The research thereby is developed adopting four possible methods and approaches already used in different aspects of soundscape study and combined to build an effective methodology to address these challenges and gain a deeper understanding of the role of soundmarks in urban public space.

2. Review of Literature

To achieve the objectives, the research includes a comprehensive literature review and a theoretical framework and methodology built upon the framework, that explores the relationship between sound, space.

2.1. NOTION OF PUBLIC SPACES AND QUALITY

A public space is a space such as a public park, garden, or square, that is open and accessible to all, regardless of gender, race, ethnicity, age or socio-economic level. An urban public space is particularly one that is found within an urban context. These Spaces give the city, form and shape; providing space for recreation, opportunities for social interaction, maintains natural beauty, and provides locations for commercial activity. Specifically, within the Sri Lankan context; "due to urbanization in recent years, the urban community has been suffering from overall stress attached to urban life" (Haatig & Staas, 2007). The urban park concept had been introduced to overcome this situation and "balance inclusive green growth in Sri Lanka to achieve a sustainable vision by 2030" (Munasinghe, 2019). Hence, urban open public spaces, are a crucial part of the city and societal infrastructure that determines the quality of life for Sri Lanka's urban population.

Urban Public spaces must possess certain qualities in general, to ensure responsiveness to human feelings and senses. Spaces built in the history are said to be "the result of intuition, traditional rules of thumb, social conditions, and the limitations of available materials" (Madanipour, 1996; Moughtin, 1992), and neither the result of conscious thought, nor the application of a set of rules. However, Urban spaces nowadays are most easily designed and defined by a plan. Local nodes such as trees and streets, as well as the adjoining surfaces, including the pavement and building facades, defines Urban Public spaces.

The components of an Urban Public space are usually twofold. It consists of physical components such as the walls that surround a space that gives space a shape, the floor on which all activities happen, ranging from flat to levelled, soft or harsh, roads, furniture, trees, topography, and roofs with sky usually acting as the roof for open spaces, and secondly the human components that include users, and their behaviours. Combining the two, spaces are designed.

Quality of urban public spaces is multifaceted. It considers both the physical and social aspects of a place. Successful public spaces are those that strike a balance between these determinants, providing spaces that are functional, safe, attractive and inclusive for all members of the community. Four main factors are often delved, in the qualitative evaluation of urban public space; access and linkage, comfort and image, uses and activities, and sociability. The soundscape plays a crucial role in shaping the comfort and image of that space.

2.2. SOUNDMARKS AND PUBLIC SPACES

The sound environment in urban spaces plays a crucial role in shaping our experiences, with soundscapes defined as the components of the acoustic environment that can be perceived and comprehended by humans. These soundscapes mediate

our relationship with the environment and influence our quality of life. In many urban public spaces, the absence of natural sounds, such as birdsong or flowing water, contributes to a monotonous auditory experience, which can lead to desensitization and a loss of place identity. This homogenization is further exacerbated by modern architectural materials like concrete and glass, which amplify urban noise and create a “canyon effect” (Landry, 2006). As cities become more visually and sonically uniform, there is a growing need to preserve unique soundmarks—distinctive sounds tied to a specific location. Schafer (1977) emphasizes the importance of identifying and protecting these soundmarks to maintain the unique acoustic identity of communities.

Soundmarks serve as auditory landmarks that enhance the sense of place and counteract the monotony of urban soundscapes. They can be natural or cultural, such as local wildlife sounds, water features, or community activities. The integration of soundmarks in landscape design can enrich the user experience, foster a sense of identity, and create a harmonious environment. This requires careful consideration of the cultural, historical, and environmental context of the site. By blending sound elements deliberately, designers can enhance the soundscape, making it more engaging and distinctive. The thoughtful use of soundmarks, contributes to a multisensory experience that reinforces the connection between people and their environment.

“Sound, environment and human” are the three fundamental components of soundscape studies (Qin Youguo, 2005). The classic disciplines of landscape, physiological and psychological acoustics, and environmental acoustics are generated through the combined study of one or two aspects. Thus, soundscape approaches comprehensively study the relationship between the three elements.

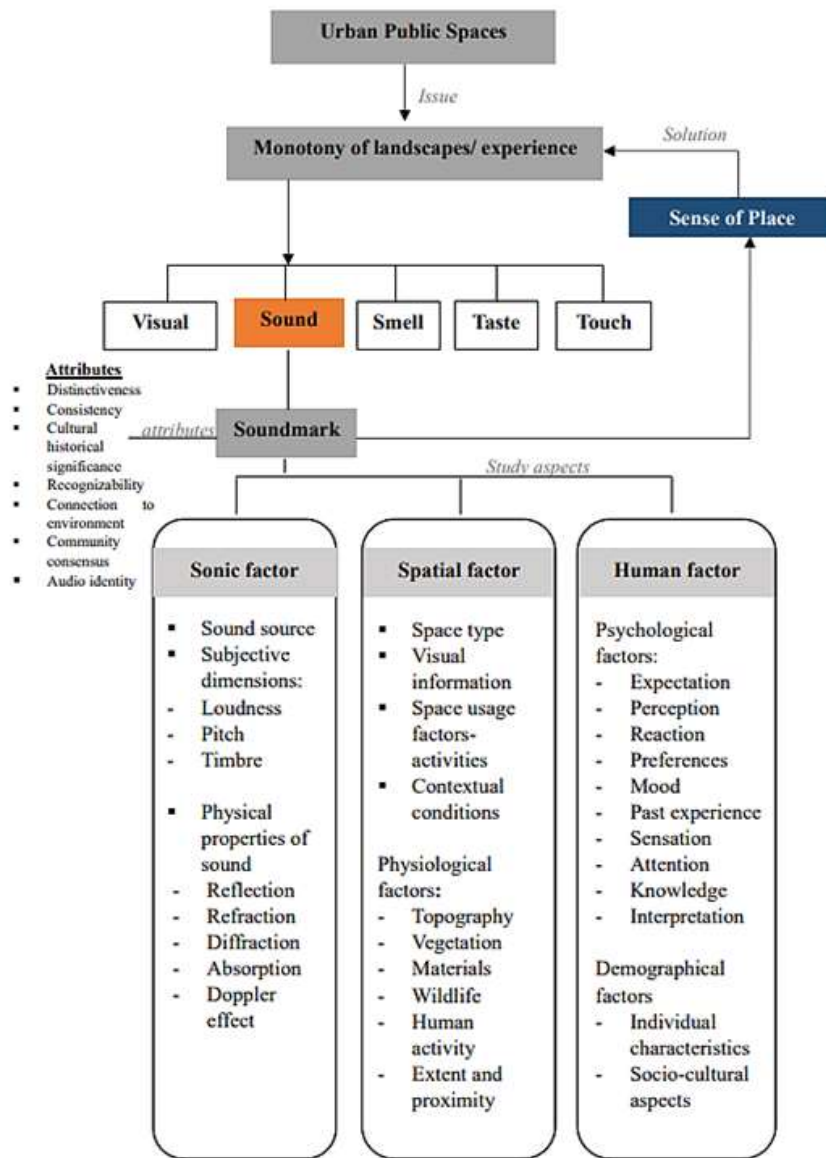
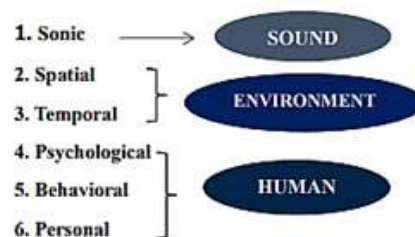


Figure 1, Theoretical Framework (Source: Compiled by the author)

Table 1, Factors affecting Soundscape perception

Previous studies related to soundscape and perception	Previously defined factors through the study	Merged factors of soundscape perception
Kang, Zhang and Kang	<ul style="list-style-type: none"> • Sound sources • Space type • Visual information • Personal Characteristics 	1. Sonic 2. Spatial 3. Temporal 4. Psychological 5. Behavioural 6. Personal
Dokmeci Yorukoglu and Kang	<ul style="list-style-type: none"> • Space usage factors (preference, frequency of usage, time spent) • Psychological factors (expectation, perception, reaction) • Demographical factors (individual characteristics, socio-cultural aspects) 	
Lindborg	<ul style="list-style-type: none"> • Expectation • Preferences • Mood • Activities 	
Bild et al. Raimbault and Dubois, Yang and Kang	<ul style="list-style-type: none"> • Physical properties of sound • Psychological factor • Socio-cultural factor • Past experience 	
Herranz-Pascual et al., Kang and Schulte-Fortkamp	<ul style="list-style-type: none"> • Sound sources • Acoustic environment • Auditory sensation • Interpretation of auditory sensation • Responses • Results • Context 	
Schulte-Fortkamp	<ul style="list-style-type: none"> • Contextual conditions • Attention • Knowledge • Past experience 	

(Source: Compiled by the author)



3. Research Methodology

The methodology consists of three areas; the selection of case studies, data collection methods, and data presentation techniques.

3.1. CASE STUDY SELECTION

Colombo City was particularly selected as the study area, taking into consideration the ongoing massive development programs to modernize Colombo City and its surrounding, under the Metro Colombo Urban Development Project (MCUDP). Three Case study areas have been selected for detailed study, an Urban Green, Urban Square, and Urban Park open for public usage:

- 1) Case Study 01- Galle Face Green
- 2) Case Study 02- Crow Island Beach Park
- 3) Case Study 03- Independence Square

Structure of the field study program

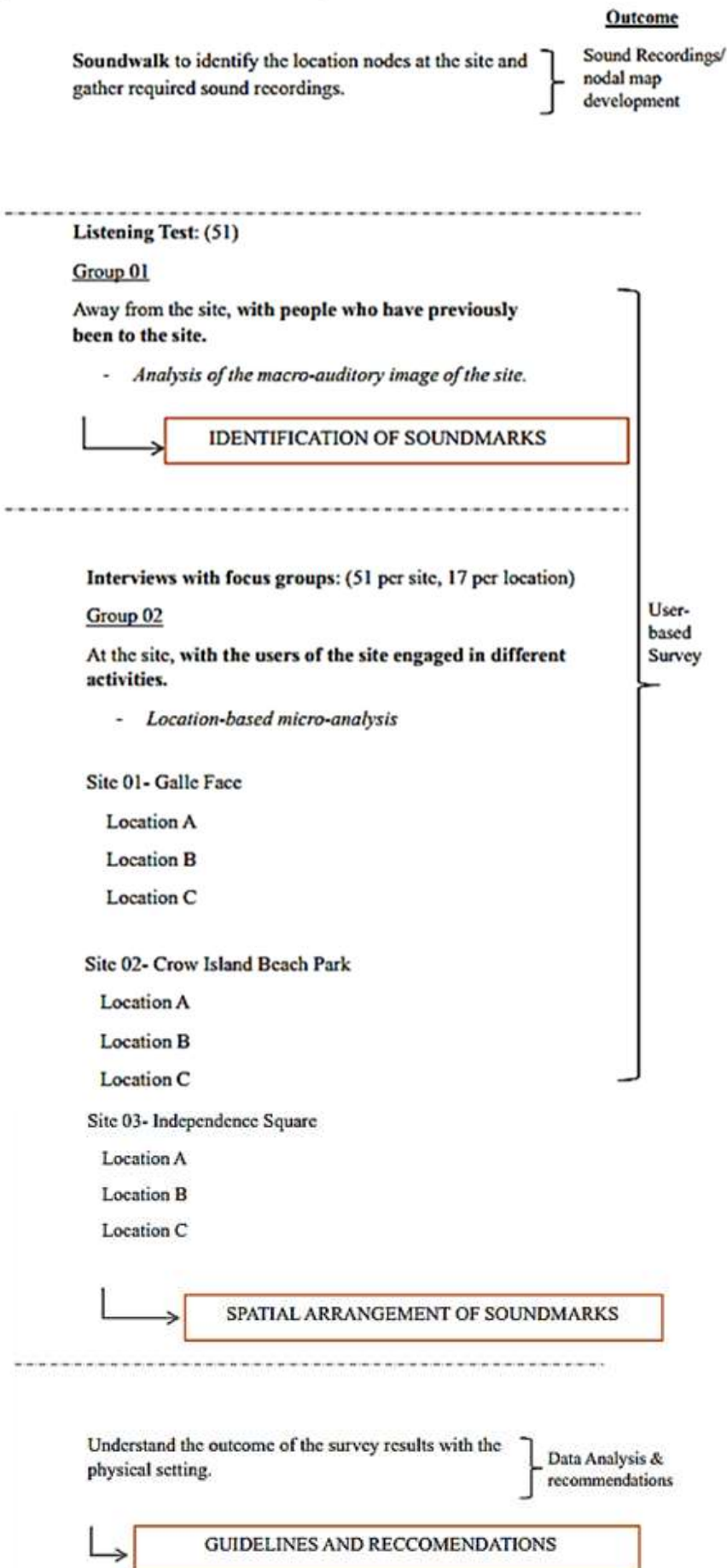




Figure 2, Case Study Map
(Source: Compiled by the author)

Table 2, Phases of the Research

	INTENTION	IMPLEMENTATION TECHNIQUE	PARTICIPANT REQUIREMENTS	SCOPE & LIMITATIONS
SOUNDWALK	Exploring the multimodal aspect of the surrounding.	Conscious listening to the sound environment. This method is carried out through both qualitative and quantitative data collection. Soundwalk performed at diverse times and days based on the objectives.	Carried out individually based on the prefix trail routes for the interpretation of soundscapes.	Variations concerning the measurements (duration, seasons) in quantitative data collection procedure and for qualitative data, it differs with, duration of the sound walk.
LISTENING TEST	Carried out to perform the sound evaluation under controlled conditions without being affected by external parameters, especially visual aspects.	For carrying out the study, a replica of the outdoor soundscape is created. It gives more focus to the participant's response to the sonic environment.	This data collection is experimented with a group that has prior experience at the site.	
INTERVIEWS WITH FOCUS GROUPS	Used in assessing the sound environment related to sound quality based on user perception.	Facilitate discussion based on the sound quality along with different parameters with an unbiased opinion. This method engages the reflective state of mind of the participants about their experience of soundscape. It also helps the participants to express their ideas with the agreed response from other participants	The data collection using interviews conducted with the interaction of users of the space from the micro-level	The various parameters used for the interview method was adopted on the basis of soundscape expectation, soundscape description, soundscape preference, soundscape perception.

(Source: Compiled by the author)

4. Data Analysis and Findings

Data collected are of two different types; Objective Data and Subjective Data.

- Objective data would include - The in-situ measurements - Identification of the sound sources, sound recordings considering the physical environment.
- Subjective data would include - Nature of human perception; which depends on sociological, psychological and cultural factors. - supported by questionnaires. - Listening tests and interviews with the users of the space, a semantic differential test for subjective evaluation.

Data variables

- Sound Source- Sound source means any person, animal, device, equipment, operation, process, activity, or phenomenon that emits or causes sound. Biophony, Anthropophony, Geophony | Point source, non-point source
- Function and Behaviour- Recreational use pattern
- Landscape character and spatial relationships- the physical setting
- Perception of sound- - Sound Identification- identification of a sound from previous encounters or knowledge. - Sound Preference- Evaluation and appreciation. aesthetic response to isolated sounds, annoying and pleasant

4.1. FINDINGS FROM THE SOUNDWALK

Through the soundwalk the below sonic findings were made, and the location nodes at the site were mapped based on the presence and distribution of sound sources, to gather required sound recordings and other data were identified.



Figure 3 - Contextual study maps of the selected Urban Public Spaces

Listening in search approach was followed to identify the above data on the sound factor. The identification intentionally or unintentionally was based on the **distinctiveness** of a particular sound from the rest in the environment; the first attribute of soundmark discussed hereto.

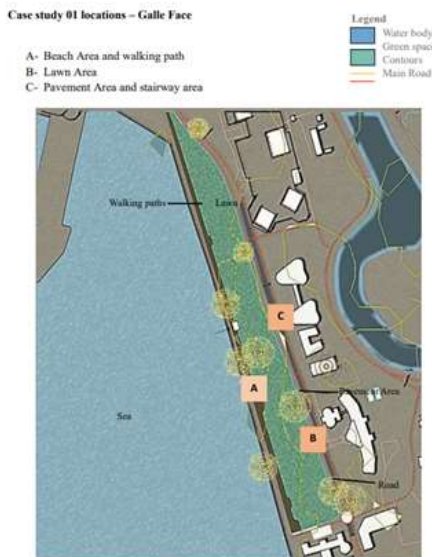


Figure 4, Location map of Galle Face Green
(Source: Compiled by the author)



Figure 5, Location map of Crow Island Beach Park
(Source: Compiled by the author)



Figure 6, Location map of Independence Square
(Source: Compiled by the author)

4.2. FINDINGS FROM THE LISTENING TEST

“A landmark is an object or feature that is easily seen and recognized from a distance”. Likewise, Soundmarks must be recognizable to those who have experienced before. It should be easily identified even if heard out of context.

An ensemble of the sound recordings captured at each site were used in the listening test- the second approach as per the methodology, to allow people with prior experience at the site to identify the site based on soundmarks, and thereby understand the social relationships with them.

Accordingly, it’s evident that the soundmarks could be identified in individual form as well as in the combined effect of one or two sounds, or a set of sounds as a whole.

- Individual soundmark- unique and specific sounds that are strongly associated with a particular place.
- Combined soundmark- a combination of sounds that, together, create a sense of place.

What sounds helped you distinguish the above soundmarks?

51 responses

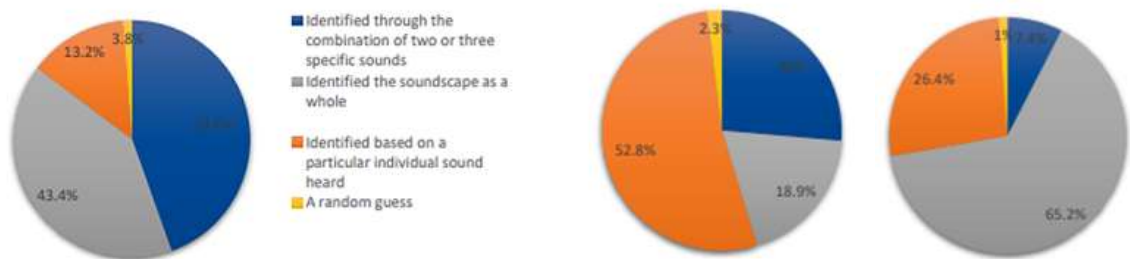


Figure 7, Identification of the form of soundmarks of case study 01, 02 & 03
(Source: Compiled by the author)

The justifications for the above distinguishments given by different respondents, were as below; “Although the sea sound is common, Galle Face should be the one with comparably more sounds, with noise”. “The chaotic sound composition of Galle Face helps in the easy distinction, whilst the continuous crow sound in the background is a clear soundmark of Crow Island. Easy to recognize”. “The one with more natural sounds- birds and the sea has to be Crow Island, the other sea sound associated with Galle face and the remaining Independence Square”. This confirms the fact that soundmark also deals with a knowledge component acquired through past experience.

4.3. FINDINGS FROM THE ON-SITE INTERVIEWS WITH USERS

However, when comparing the below graphs obtained from the listening test, with the data obtained through the on-site questionnaire-based interview, questioning the prominent sounds heard at the location, it is understood that the identified soundmarks through the reawakening of past experience are not always the most prominent sounds heard on site.

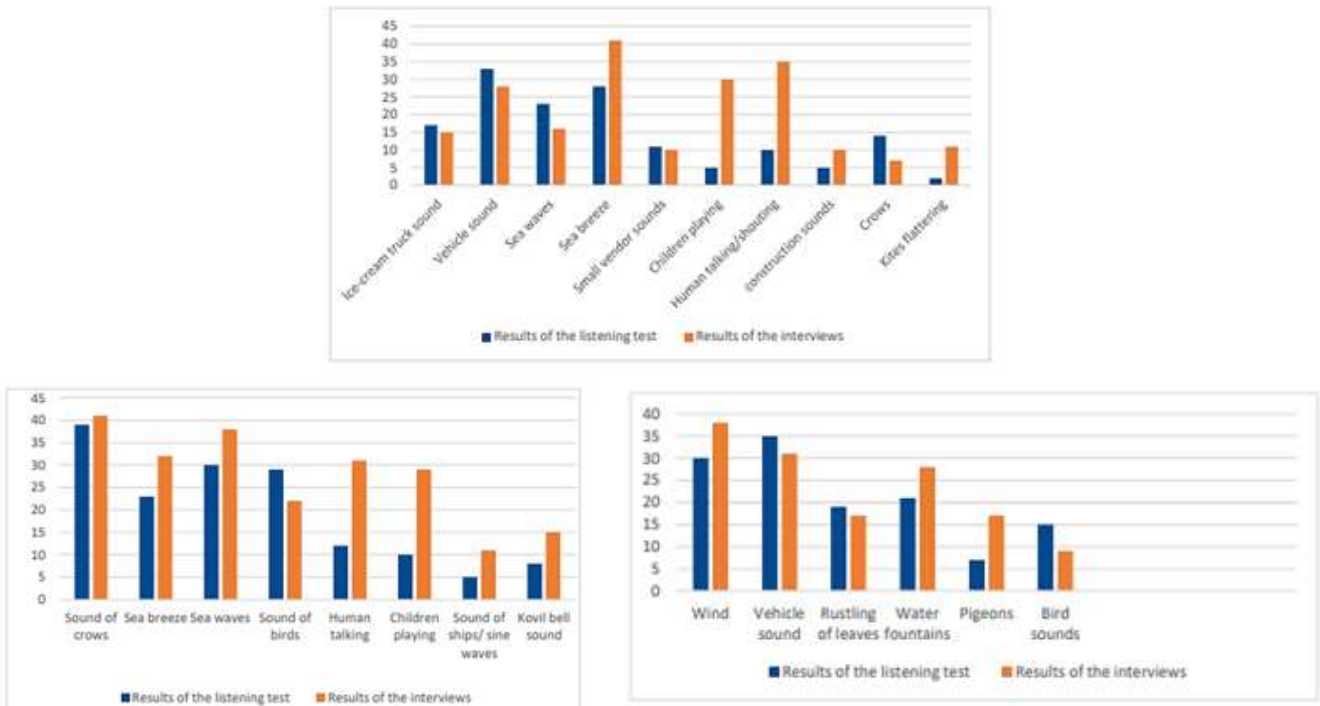


Figure 8, Comparison of the results of the listening test and on-site interviews of case studies 1, 2, & 3 (Source: Compiled by the author)

In the process of understanding the reason for disparity, further analysis on the regard, led to the realization that the prominence of the above identified soundmarks varied from location to location within the site, leading to the distribution factor of sounds.

The spread may depend on factors like the extent of the source, intensity of the sound produced, closure of different spaces impacting the spread, attenuation affected by materiality and other physiological parameters, highlighting the attribute of soundmark; connection to environment. However, without careful planning, architecture may overwhelm or obscure the unique soundmarks that give spaces their distinctive character.

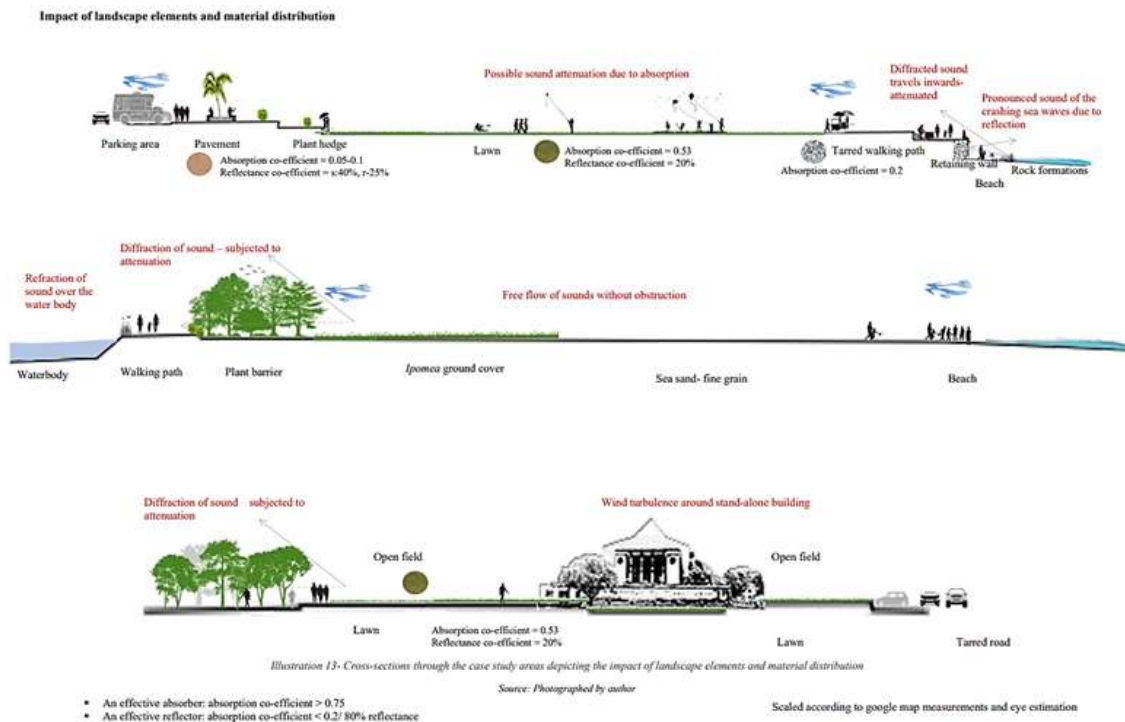


Figure 9, Cross-sections through the case study areas depicting the impact of landscape elements and material distribution (Source: Compiled by the author)

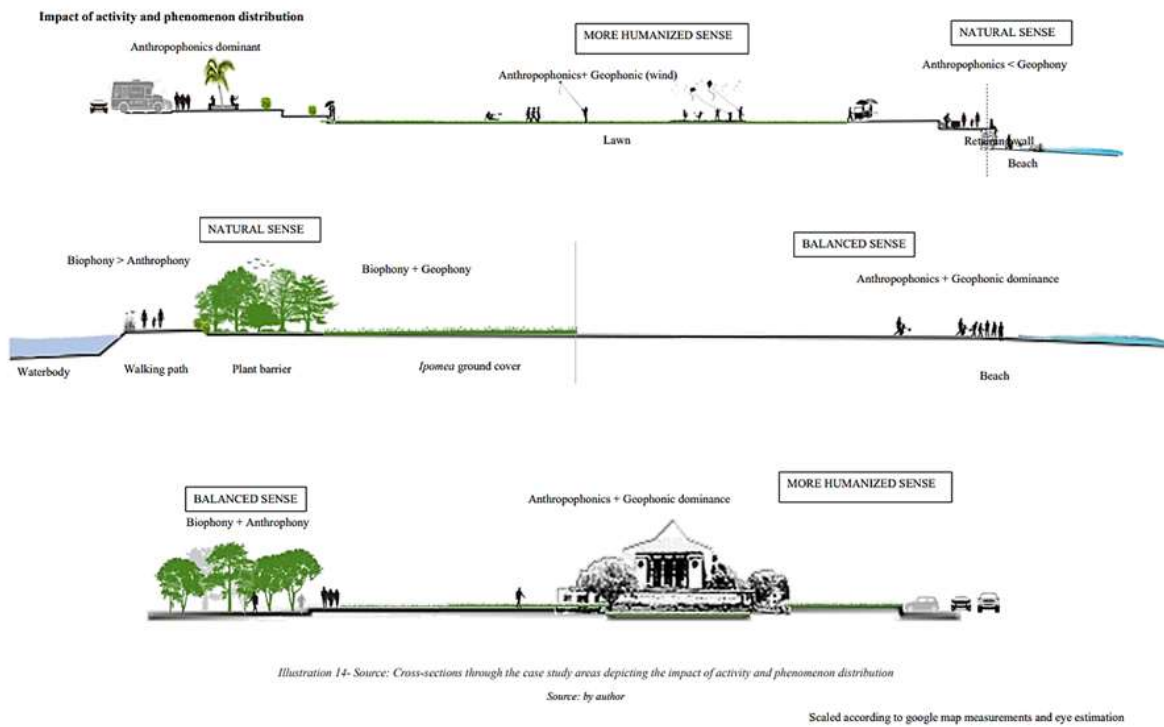


Figure 10, Cross-sections through the case study areas depicting the impact of activity and phenomenon distribution (Source: Compiled by the author)

Based on previous aspects discussed under each factor analyzed thus far, the respondents comprehended an overall sense for each site based on sound. The results of it are as below;

Meanwhile, when probed on the overall soundscape experience based on the soundscape, The following results were obtained (figure 11);

Table 3, The perceived sense of each case study site

Galle Face		Crow Island Beach		Independence Square	
Boring- unbearably quiet	0%	Boring- unbearably quiet	1.9%	Boring- unbearably quiet	26.9%
Calm and quiet	0%	Calm and quiet	15%	Calm and quiet	65.4%
Calm yet lively	1.9%	Calm yet lively	67.3%	Calm yet lively	7.7%
Loud and lively	61.5%	Loud and lively	11.5%	Loud and lively	0%
Chaotic- too many sounds in one place	30.8%	Chaotic- too many sounds in one place	3.8%	Chaotic- too many sounds in one place	0%

(Source: Compiled by the author)

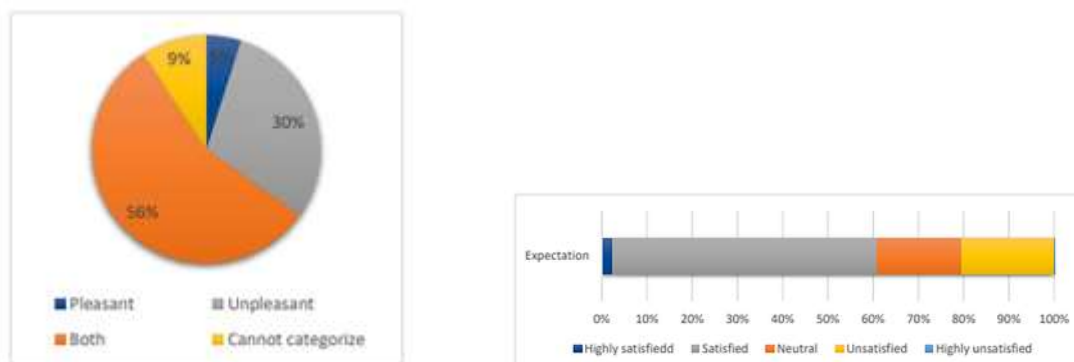


Figure 11, User response on pleasantness or un-pleasantness of perceived soundmarks

Whilst a considerable portion of the respondents have attested the sounds to be unpleasant, their response to the question if their expectation of the soundscape aligns with the purpose of their presence at the site, 60% vouched positively.

This attests, how soundmarks have been able to develop a sense of place which people expect of, to witness upon arrival. However not all senses attributed for each place is fully acknowledged, certain improvements expected too we recommended by the respondents. Taking to account these recommendations and the outcome of the analysis, the following guidelines and recommendations (Section 4.5) have been developed.

4.4. DISCUSSION

In summary, a soundmark is a distinct auditory attribute that helps the distinction of one place from another in the field of landscape architecture, hence a supportive tool to build a unique identity to a place. Soundmark however unlike landmark is not an individual element, it is most often identified in its combined effect of sounds emitted by different sources due to the schizophonic (all over) nature of sound. Thus, perceived together since isolation is merely impossible under normal conditions. Further, it was clarified through the case studies 1 and 2, that although sound is schizophonic and the source of emitting sound would be common between places, there is possible distinction of a place through soundscape alone, through the unique combination of sounds. The combination may vary based on the type of place determining the type of sounds produced based on activity, presence of natural sounds, and artificial sounds and sounds unique to a given context. However, despite the influential capacity of soundmarks to create unique spaces, as discussed, monotony between spaces is yet witnessed since these soundmarks act as Lo-fi; cannot be heard properly due to the masking from other sounds, which acts as a disturbance, termed noise pollution. Hence, urban planners, designers and landscape architects must make an effort to identify, preserve, and enhance these soundmarks that are unique to a place, identified by the study of human, spatial and sonic factors, to enhance the overall experience of users. There also lies the capacity to manipulate the properties of sound, due to reflective, diffractive, refractive, and absorbent properties of sound, affecting the qualities of sound; loudness, pitch, and timbre. The design of soundscapes must however be done following an intricate study on the factors discussed; The sound itself, its interaction with the environment and how it is been perceived by the users to preserve the sense of a place.

4.5. GUIDELINES AND RECOMMENDATIONS

Variety and Diversity of sounds include a mix of natural, cultural, and functional sounds, and enhances spatial experience. The idea of using sound as a Guiding Element in Urban Spaces as identified through the study are as below.

- **Spatial Arrangement to Complement Existing Soundscapes**
Design the spatial arrangement of sound sources and landscape elements to enhance the inherent sound character of the setting.
- **Sound-Responsive Material Selection and Placement**
Select and place materials that interact harmoniously with the existing sound environment. Reflective surfaces, absorptive materials, and other elements should be chosen based on their ability to either project or soften sounds already present in the space. This approach helps the architecture to emphasize desired sounds rather than introducing competing ones.
- **Timing and Sequencing Based on Existing Rhythms**
Introduce timing and sequencing of sounds (e.g., bells, water features, or pedestrian traffic) that resonate with natural or cultural rhythms in the environment. This can create distinct “soundmarks” that are in harmony with daily or seasonal sounds, such as morning birdsong or evening traffic.
- **Integration with the Sense of Place**
Align all sound-related elements with the existing or intended atmosphere of the area. For example, in a lively market square, architecture can enhance the vibrancy by shaping spaces to channel the ambient buzz of conversations and music, while quieter areas like libraries or parks may use natural sound barriers to preserve tranquility.
- **Public Space Layout Guided by Soundmarks**
Develop a public space layout that integrates soundmarks as central, defining elements. Rather than forcing an artificial soundscape, these soundmarks should naturally occur or be subtly enhanced to support the character of the place—such as incorporating fountains near plazas to create gentle background sound.

5. Conclusion

In conclusion, in the process of understanding the impact of soundscape on the sense of place of an Urban Public Space, and understanding the idea of soundmark as a contributory tool for it, the following conclusions can be arrived upon. This dissertation has explored the multifaceted relationship between soundscape and the quality of urban public spaces. Through a comprehensive analysis of soundscapes, soundmarks, and their spatial arrangements, this study has provided valuable insights on the complex interactions between auditory experiences in urban environments. The key findings and contributions of this study can be summarized as follows: **Soundscape Impact:** The study has revealed that the soundscape significantly influences the quality of urban public spaces. The auditory environment plays a crucial role in shaping people's perceptions, activities, behaviours, and overall satisfaction within these spaces. **Soundmarks contribute to the overall ambiance of urban areas minimizing the monotony of spaces.** **Identification of Soundmarks:** By employing case studies and

rigorous criteria, the study has successfully identified and defined soundmarks within urban public spaces. Soundmarks serve as distinctive auditory landmarks that hold cultural, historical, social, or locational significance. Recognizing and preserving such soundmarks can contribute to a more meaningful urban soundscape. Accordingly, it was made clear that Soundmark unlike a landmark, is not necessarily a single sound generated from a single source; it could be composed of a combination of a few sounds generated by different sound sources; that create a unique soundscape through its interactions with the surrounding entities that are perceived by its users, together as a soundmark. However, a soundmark irrespective of pleasantness or unpleasantness, or prominence, is necessarily one that is familiar to its users. It is further understood that the unique intensity levels of the sound, and frequency of occurrence contributes to the identification of a soundmark of a place. It has the potential to change along with spatiotemporal changes. Hence, lies the potential to enhance and manipulate an identified soundmark based on the requirement to evoke a stronger sense Spatial Arrangement and Social Relationships: The analysis of the spatial distribution of soundmarks has provided insight on how the positioning of sound emitting elements influences social interactions and relationships among users of public spaces. The research has shown that the strategic placement of soundmarks can enhance the sense of place and promote social cohesiveness. In conclusion, this research contributes to the broader understanding of how soundscapes can be harnessed as a valuable aspect of urban design, by recognizing the significance of soundmarks and their sound-space relationships. Thereby, Urban Planners, Landscape Architects, and Designers can create more inclusive, culturally rich, and socially vibrant public spaces with unique senses, avoiding monotony. Our environment too must be treated as a concert hall, paying much attention to the acoustic furnishings. These findings facilitate soundscape thinking in Landscape Architecture and related fields, having implications for future urban development, and offering a framework for enhancing the overall quality of life in cities through thoughtful soundscape design.

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