Public Perception on Hostile Landscape Architecture in Urban Residual Spaces under Flyovers in Western Province, Sri Lanka

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Abstract

Residual spaces are unintended byproducts of infrastructure-led urban development, often found beneath flyovers or along transportation corridors. They highlight fragmented city planning and a lack of inclusive spatial strategies. These areas are informal and unsafe neighbourhoods where marginalized groups often live in neglect and poor management. As a result, these spaces reflect urban inequalities by highlighting the problems of spatial exclusion and access to shared urban resources in an unequal manner. To address such challenges, many global cities have adopted hostile architectural urban design strategies aimed at deterring unwanted behaviour through physical barriers or discomfort. This study aimed to explore the relevance and appropriateness of such strategies in the Sri Lankan context by evaluating public perceptions of residual spaces beneath three flyovers: Kelaniya, Nugegoda, and Dehiwala. Using mixed methods, the study examined the role of design elements like form, texture, colour, accessibility, functions, and visual weight on how people feel and belong in the place. It employed site-based observations and questionnaire surveys, including a pre-test/post-test analysis to record any perceptual changes with regard to an altered spatial design. Findings suggested that the absence of thoughtful landscape interventions contributed to increased misuse of the public space and social disengagement. Based on public perception data, it is anticipated that the necessity of the strategic hostile landscape interventions at residual spaces is increasing, not to exclude but to frame their controlled usage. In this study, it is suggested that the design of neighbourhood character of residual spaces should be capable of controlling behaviour and also the accessibility of the population by integrating landscape architecture.

Keywords: Residual Spaces, Hostile Landscape Architecture, Spatial Justice, Spatial Safety, Flyovers, Sri Lanka

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Introduction

The leftover spaces in urbanization, residual spaces that remain due to infrastructural and land use changes, are everywhere within the cities that are rapidly urbanizing. These areas can be informalized under flyovers, between gaps in buildings, and along transport corridors, serving to house the homeless and offer a market or temporary parking space, but also home to the dumping of waste, loitering, and petty crime (Trancik, 1986; Madanipour, 1999). Such under-flyover spaces are very prominent in Colombo, but not managed properly and seen as insecure and unsafe by most people. This study poses the question of whether hostile landscape architecture exclusionary design interventions (to discourage certain behaviours) are a valid means of addressing perceived safety issues, or whether it does more harm than good in terms of spatial injustice and marginalization. The study is based on two related sets of literature: spatial safety (spatial design and technologies aimed at minimizing crime or fear of crime) and spatial justice (equal access to and distribution of urban resources). The gap in Sri Lankan literature concerning the topic of hostile design is addressed by the study through the description of the perceived attitude of the population and quantifying the impact of the suggested measures in three flyovers in the Western Province. The information and site description are based on fieldwork and analysis records that were made during the research of under-flyover spaces.

Literature review

Residual Urban spaces

Residual spaces are the unplanned spatial factors that are out of the formal planning and maintenance schemes (Trancik, 1986; Madanipour, 1999). Their unclear ownership and purpose make them prone to informal, ad hoc uses, e.g., vending, dumping, or sheltering. Structural inequalities regarding the availability of urban amenities and resources are often revealed in these spaces in the Global South (Yiftachel, 2009). Scholars state that, despite the generally negative labelling of residual spaces in society, they simultaneously hold a latent promise regarding ecological, social, and recreational uses under methodological sensitivity.

Spatial Safety

Spatial safety is an issue that has been considered a crucial one within the fields of urban design and criminology. Jane Jacobs (1961) argued that animated street life, which she called an eye on the street, helps places to be safe because of the informal social control. The rationale is that those environments should be established that promote legitimate and repeated activity, including shops, seating, and transparent building fronts, which facilitate routine surveillance and, therefore, reduce fear of crime. The New Yorker CPTED, when applied to residual spaces, suggests several low-cost interventions, such as enhanced lighting, clearing the sightline, use of territoriality, and use of activations, which can diminish the perception and occurrence of crime. The critics, however, contend that when applied to CPTED in a limited technical way, it may become exclusionary strategies whereby the design to deter crime may result in a design to keep people out. In this regard, the literature distinguishes inclusive CPTED that integrates environmental interventions with social programs and exclusionary devices that only relocate issues. There is empirical evidence on technical interventions, with systematic reviews of interventions on street-lighting showing that increased levels of illumination are linked with a decrease in some crimes.

Perceived safety increases in most situations, but this again differs depending on the context and is not likely to be effective alone unless supplemented by other measures. According to Defensible Space by Oscar Newman and the larger Crime Prevention Through Environmental Design (CPTED) agenda, crime opportunities can be minimized with the aid of physical design, and perceived safety can be increased by using natural surveillance, territorial reinforcement, access control, and the state of repair (Newman, 1981; HUD, 2008).CPTED has become quite prevalent globally and is often viewed as the cornerstone of design-based safety intervention.

Spatial Justice

Spatial justice formulates the conceptualization of injustice in both spatial and material form, which asserts that resources, services, and the right to place are not equally distributed within the urban fabric. As Soja (2010) and Harvey (2008) state, a proper conception of justice should be sensitive to the spatial relations and to the right to the city, which is the ability of the inhabitants to influence and to obtain urban resources. Neglecting the residual spaces in the planning implies unfair distribution of focus and resources, and the exclusive design approaches can change the planning negligence to active spatial marginalization. Therefore, the aggressive interventions raise ethical concerns about who has the right to live, sleep, or carry out business in the street.

Hostile Architecture (HA) and Hostile Landscape Architecture (HLA)

Hostile architecture (HA) refers to the intentional use of physical features that attempt to discourage certain actions, including anti-homeless spikes and benches that are purposefully spaced apart (Katyal, 2002; Kohn, 2004). According to the supporters of HA, these interventions increase the level of safety among people, lower the expenses of maintenance, and advance social order. Critics, on the contrary, believe that these actions are ethically questionable; they are used as a tool of exclusion and indirect social control (Petty, 2016).

When these concepts are applied to the landscape architecture discipline, which is known as hostile landscape architecture (HLA), ecological and spatial discouragements are presented. These may be the spacing of thorny shrubs, the provision of uneven paving surfaces, the uplifting of planters, and target lighting which does not invite hanging around, lying down, or hiding (Loukaitou Sideris, 2006). In contrast to outright hostile objects that can be easily night-marked as punitive, landscape-based deterrents are often woven into aesthetic improvements, thus blurring the border between ecological design and even social control.

There is no resolution to the ethical dilemma: on the one hand, hostile features can be used to enhance the sense of safety of certain population groups, but on the other hand, they can also exclude vulnerable groups. With the specific socio-cultural dynamics in the Sri Lankan context, where no extensive studies have been done to date to understand the residual urban spaces, a great potential exists to empirically examine these paradoxical results.

Theoretical Framework

The Fig 1 below integrates the theory of residual space, CPTED, and spatial justice to form its conceptual framework. Hostile landscape architecture is reviewed as the mediating construct between the characteristics of the built environment and perceived safety and justice.

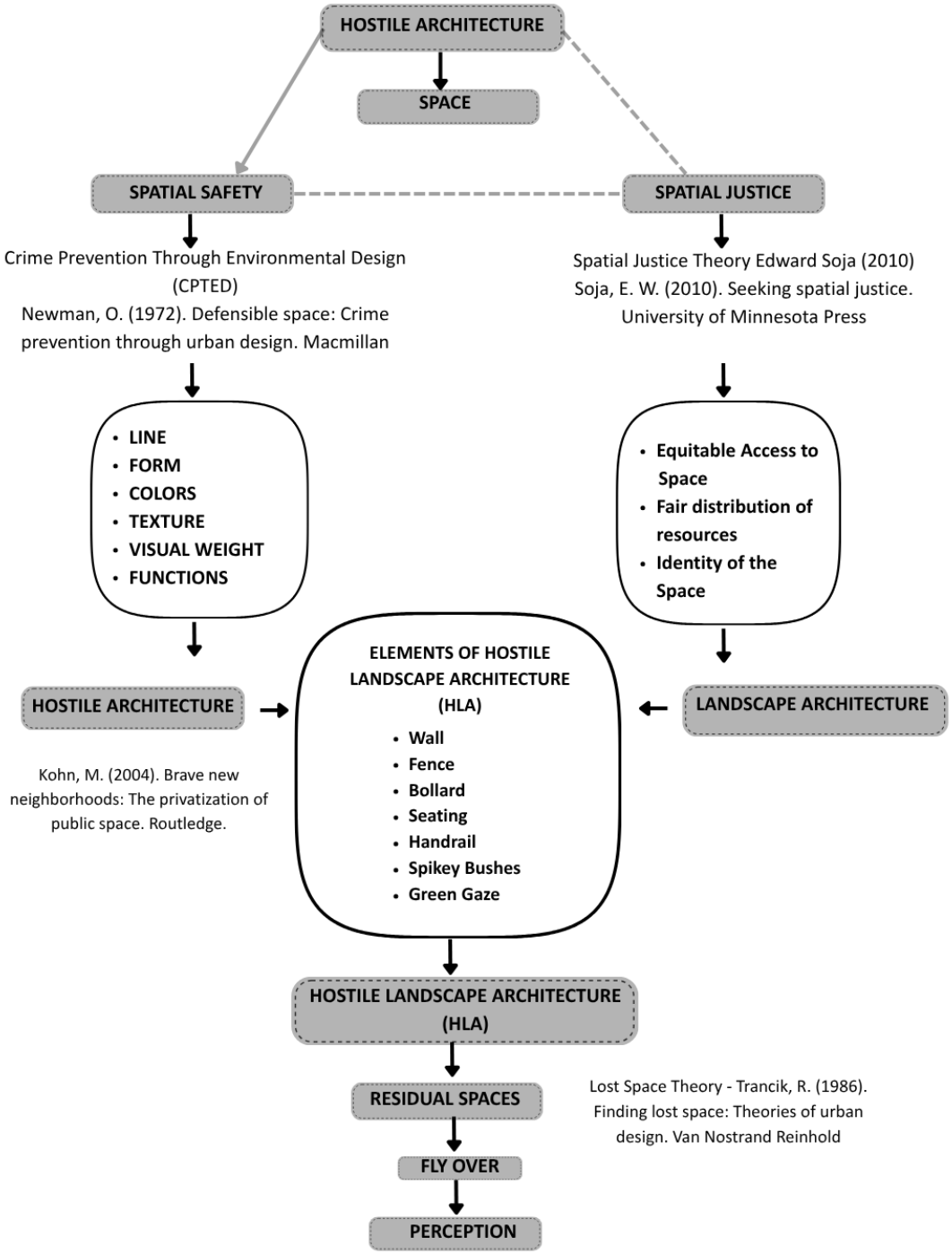


Fig. 1: Theoretical Framework
Source: author

Methodology

Research Approach

This study used a mixed-methods research design, which incorporated quantitative surveys with qualitative observations and documentation of the sites. The reasoning behind such a methodological approach was to both measure the empirically quantifiable variations in the perceptions of safety and justice and to measure the subtle spatial relationships that defined residual flyover spaces. A compounded analytical approach, comprising pre-test and post-test comparisons, t-tests, and interpretive observation, was embraced to ensure that the resulting findings captured both the statistical regularities as well as the lived realities of the urban environment of Colombo.

Case study selection

The Western Province of Sri Lanka was chosen, and the three case studies were selected from the residual areas underneath large flyovers: Kelaniya Flyover, Nugegoda Flyover, and Dehiwala-Mount Lavinia Flyover. These locations were selected because they were quite visible within the Colombo metropolitan area, they have apparent residual spaces under the flyovers created by the transport infrastructure, and the recurrent concerns of safety, informality, and non-utilities were reported in municipal planning discourses. The locations are all cities with their own urban environment. Kelaniya is a large transport centre, but the underground space is left unattended and in a poor state. Nugegoda is a district with a highly populated business centre, and Dehiwala-Mount Lavinia is a sign of mixed use in which the under-space is already associated with insecurity and an abandoned state. A mix of these sites is an approximation of the remaining space pressures in the Western Province, and this decision improves the generalizability of the study, besides an informative comparison of how the hostile landscape strategies are viewed in various urban environments.

Data collection methods

Three major methods of data collection were used. Primarily, systematic field observations were made at all locations, documenting physical conditions, typologies of users, and temporal changes in activity, and space characteristics such as line, form, colour, texture, and function. Photographic records were used in addition to the observational data to have the visual documentation of the spatial character and user behaviour.

Second, a questionnaire was given to 60 participants (20 per site) in a structured form. The sample was taken to have a heterogeneous group of people who were regular users, passers-by, and local residents of the immediate localities. The questionnaire included questions on Likert scales to assess the perception of safety and justice in given environmental conditions (pre-testing) or given hostile design conditions (post-testing). The object construction served to determine how design interventions, including planting, lighting, barriers, and surface treatments, affect the perception of safety and justice.

Third, semi-structured interviews were conducted among municipal officers, urban planners, and members of the community. The results of these conversations provided insights into the professional and local views on the use of hostile design in Sri Lanka, which supplements the survey and observational data.

- Participant samples

Sixty participants were used in the study; twenty of them were used at each location. This number was picked given time, accessibility, and resource constraints in gathering the data, although there was sufficient representation of all three locations. Perception-based research in Sri Lanka and South Asia has adopted similar sample sizes (Perera, 2019; Jayasinghe and Hettiarachchi, 2021), which suggests that a sample size of 50-70 participants is adequate to represent the major trends in behaviour and perception. As such, the sample size that is adopted is deemed appropriate to address the research objectives and give useful information to rely on during analysis.

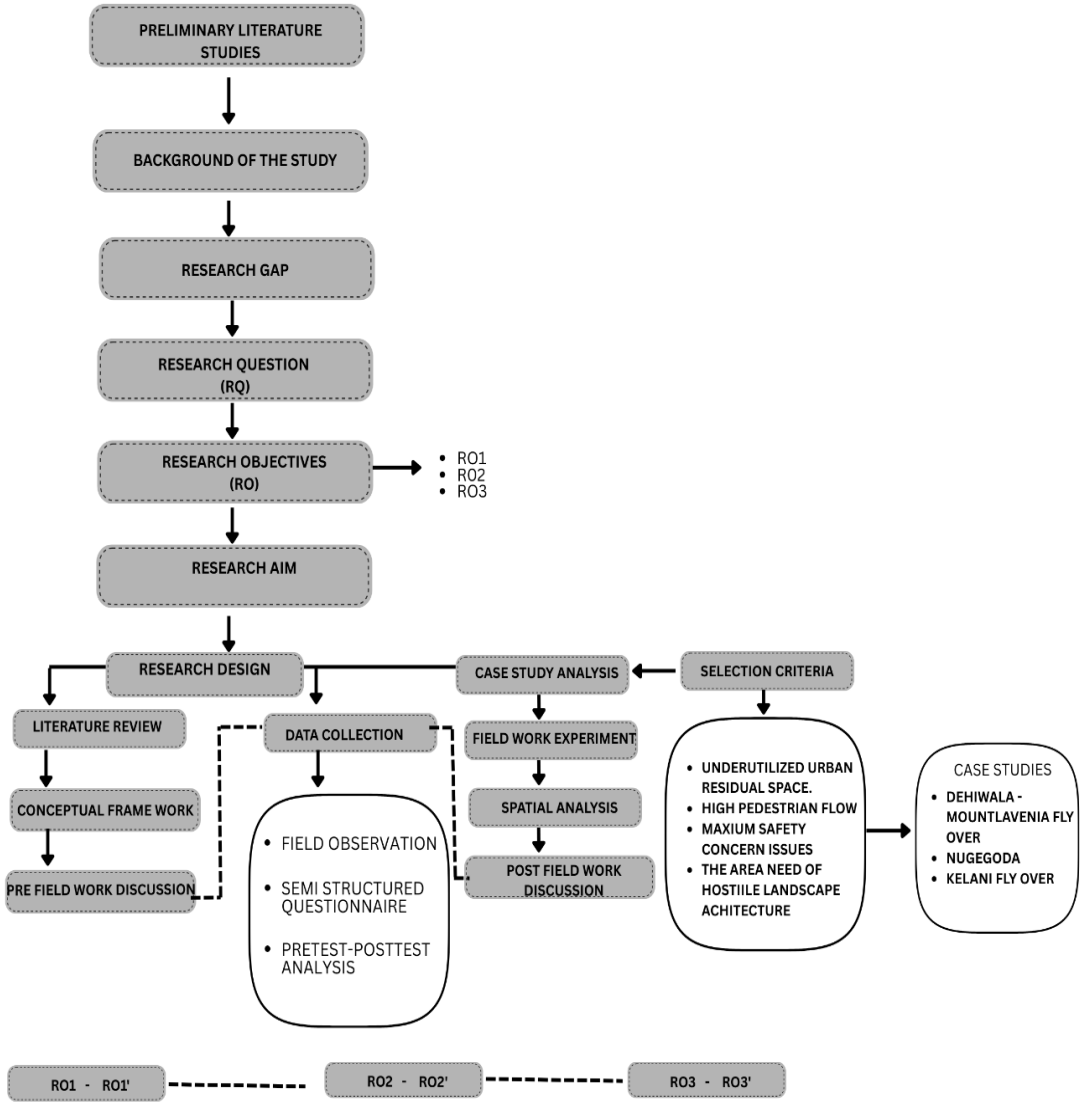


Fig. 2: Research Design Diagram
Source: author

Data Analysis

Both qualitative and quantitative methods were used in the analysis. The results of the pre-test and post-test surveys were compared using paired sample t-tests to determine whether the difference in the perceptions regarding safety and justice was statistically significant. Descriptive statistics have been used to generalise the trends across sites; thus, revealing differences in Dehiwala, Nugegoda, and Kelaniya. Thematic coding was used to analyse the observational data, with the focus on the activity patterns, occurrences of misuse, and physical features of spatial arrangements that led to the feeling of insecurity. This procedure allowed triangulation of self-reported survey data and empirical observations. The transcripts of the interviews were coded similarly to identify the recurring themes, especially the ones that concerned the attitudes towards the exclusion, inclusion, and responsibility in the management of the space under flyovers. The combination of statistical tests and qualitative interpretation allowed the study to go beyond quantitative descriptions of the situation, placing quantitative alterations in perception in the larger context of the urban fabric.

Ethical Consideration

The study involved human subjects and a physical location, which had been used by the marginalised population and thus required an increased level of ethical consideration. The survey and interview participants were thoroughly informed about the intention of the research and gave verbal consent before taking part in it. Anonymity was provided through the removal of identifying details of responses, and also no personal details could be attributed to individual opinions.

Photographic recording was confined to spatial states, thus evading the direct images of the vulnerable people, like informal residents or street traders. The research was positioned as an exploration of the perceptions, but not a verdict of user groups, so that the stigmatisation of communities with already existing social exclusion could be avoided. Moreover, the discourse on hostile landscape architecture was offered in a critical manner with due sensitivity to the fact that interventions may unintentionally make some people marginal.

These ethical issues were explicitly considered in the study to maintain the integrity of academics, and at the same time, the rights and dignity of participants and users of residual spaces were not violated.

Results and discussions

Case study and Findings

- *Under the Dehiwala Mount Lavinia Flyover*

The Dehiwala Mount Lavinia flyover is a good example of how urban infrastructure can subconsciously breed social breakdown under its structural canopy. As a major road traffic route within Galle Road, the area under the flyover is a vacuous grey area. It has been usurped by irregular parking, unofficial occupation of marginalised people, and a waste pile, all of which are indicators of spatial abandonment. The massive concrete structure and deep shadows of the flyover create an ambience of isolation as opposed to safety. Even though the use of deterrent

measures like fencing, barriers, or excessively bright lighting may seemingly bring back order, these measures would also aid in strengthening exclusivity. These actions are taken to deal with visible disorder, but fail to think of the disconnection between the infrastructure and the community around it. The Dehiwala site, therefore, demonstrates the irony of the hostile landscape architecture; it can control the undesired behaviour at the same time as it undermines the social inclusivity and humanistic nature of the social space. The ensuing ambiance is sanitised but deprived of feelings. The environment is apparently secure but unfair in experience.

- *Under the Nugegoda Flyover*

The Nugegoda flyover is located in one of the busiest commercial intersections in Colombo, where road and foot traffic are intermingling. However, the under-space serves as a piecemeal urban pocket that is characterised by informal parking and temporary social activity. The strict geometry, lack of natural lighting, and lack of specific pedestrian space make the space uncomfortable visually and psychologically. The addition of hostile landscape elements in this case would improve control and discipline, but would not improve comfort or fairness. Although formal design would bring visual order, it would probably exclude small vendors, low-income commuters, and informal users who already rely on this area. The Nugegoda case thus reveals the temptation towards safety and cleanliness brought about by deterrent design to become discriminatory accessibility. Instead of creating an inclusive civic order, aggressive interventions convert the urban commons to intended enclaves of privilege, which exposes the deep-seated tension between aesthetic control and social justice in the present practice of the urban landscape.

- *Under the Peliyagoda Kelani Flyover*

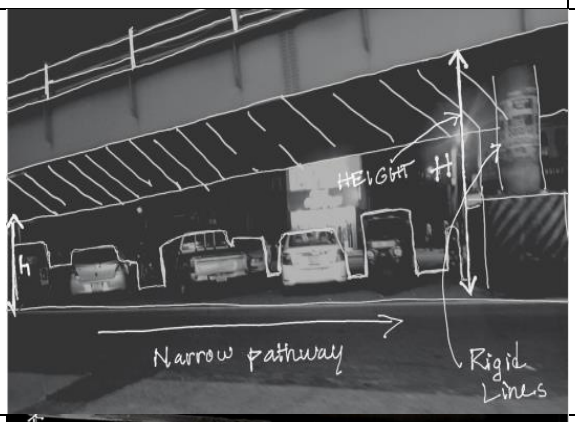
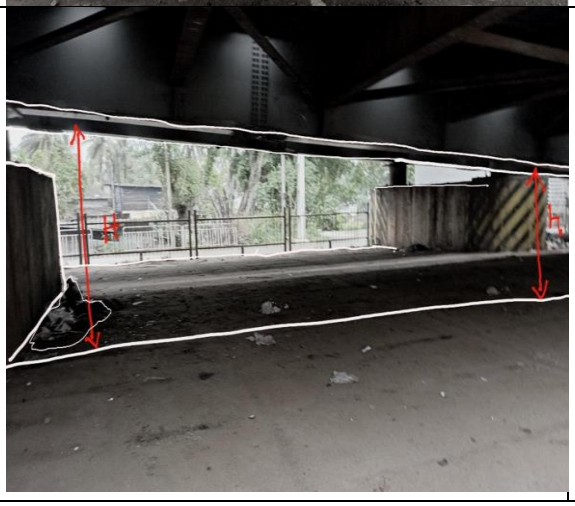
Peliyagoda Kelani flyover is one such infrastructural detachment where the under-space has been developed as a by-product of the traffic engineering and not as a civic space. The space underneath is placed on the Colombo-Kandy transport axis, and it is rather inactive, with some parking, random debris, and little human activity. Lack of conscious design has made the area aesthetically sterile and socially incoherent. The implementation of hostile landscape elements, like barriers or patterned light, would make visual safety a cosmetic issue and would also solidify its emptiness by making it less appealing to people. This is what can be described as an ethical dilemma of deterrent design in low-social situations: order is not obtained by inclusion, but erasure. The Peliyagoda case illustrates how infrastructural rationality, which is not intrinsic to the needs of people, creates the space of control that replaces the possibility of public life with silence and surveillance. It represents the topography where domination poses as enhancement, and disregard is interpreted as safety.

Comparative Analysis

Table 1 gives a comparative graphical analysis of three case studies, namely Dehiwala Mount Lavinia, Nugegoda, and Peliyagoda Kelani Flyover, looking into their spatial features and situational factors under the flyovers. The form and line of these sites produce narrow paths, inflexible constructions, and limited movement dominated by mass infrastructure. All three sites appear dark, dusty, and neglected in terms of texture and colour, which is further enhanced by industrial colours, including black, grey, and yellow hazard markings. Such residual spaces are currently in use in varying ways: Dehiwala is informal waste storage, Nugegoda is used mainly as parking, and

Peliyagoda is a residual space under a flyover with scattered purposes. Nonetheless, fair distribution of resources is still doubtful in all locations since the areas do not seem fairly used, run-down, and dominated by informal behaviours instead of integrative city planning. Taken together, the cases highlight how under flyover areas in Colombo are not properly incorporated into the city fabric, with no fair design interventions and making the city more inefficient.

Table 2: Observation Analysis under the Flyovers

Parameters	Line/ Form	Texture / Colour
Dehiwala-Mount Lavinia Flyover		
Nugegoda Flyover		
Peliyagoda Kelani Flyover		

Parameters	Functions	Fair distribution of Resources
Dehiwala-Mount Lavinia Flyover		
Nugegoda Flyover		
Peliyagoda Kelani Flyover		

Source: author

Pre-Test and Post-Test Analysis

Table 2: Pre-Post Justice

Case Study	Pre Test	Post Test
Dehiwala Mount Lavinia Flyover		
Nugegoda Flyover		
Peliyagoda Kelani Flyover		

Source: author

Table 2 shows a graphical comparison between the pre-test and post-test status of the residual space under the flyovers of Dehiwala-Mount Lavinia, Nugegoda, and Peliyagoda-Kelani flyovers. The photos show how untidy and unsafe pre-test areas were changed to better post-test spaces with seating and planting, which shows the increased usability of the space. This comparison is helpful because it visually illustrates the change in perception after design intervention, which is a methodological approach. In order to determine the difference in perceived comfort and usability, the respondents were requested to compare the two conditions on the five-point Likert scale, which would provide an opportunity to quantify the change in the perception of the population.

The following table 3 presents paired-sample statistics of pre- and post-intervention perceptions of justice (PRE JUS and POS JUS) of a group of participants (N=60) with a mean of 1.6933 and 2.2833, respectively. The resultant increase is an improvement in perceived justice after the design interventions, hence justifying the objective of the study, which was to create a balance between control and accessibility in the residual spaces.

Table 3: Pre-Post Justice

Paired Sample Statistics (Pre Pos justice)		
	No	Mean
PRE JUS	60	1.6933
POS JUS	60	2.2833

Source: author

Table 4 uses paired-sample statistics to compare pre- and post-intervention safety perceptions (PRE SAF and POS SAF) with a sample size of 60 and means of 1.6917 and 2.5167, respectively. The rising mean post-intervention score shows that there was a greater perceived safety after the intervention, thus proving the hypothesis that an in-depth design could minimize the fear of crime in vacant areas.

Table 4: Pre-Post Safety

Paired Sample Statistics (Pre Pos Safety)		
	No	Mean
PRE SAF	60	1.6917
POS SAF	60	2.5167

Source: author

The paired sample statistics to compare the respondents' perceptions about whether the design discourages people from staying or relaxing (mean = 1.6833) with the perceptions of the respondents about whether the design might be enhanced to create a higher degree of comfort (mean = 2.6333), which is based on the sample of 60 respondents. The fact that the mean scores have increased means that design interventions could be used to increase comfort, which confirms the hypothesis that considerate landscape changes could mitigate the hostile aspects.

Table 5: Paired Sample Statistics Design discourages staying and being comfortable in this space

Paired Sample Statistics Design discourages staying and being comfortable in this space		
	No	Mean
The design discourages people from staying or relaxing.	60	1.6833
I would feel more comfortable in these spaces if they had	60	2.6333

Source: author

Discussion

This paper has discussed the role of Hostile Landscape Architecture (HLA) in influencing perceptions of safety and inclusion in under-flyover spaces in the Western Province of Sri Lanka--a problem at the heart of keeping track of neglected urban infrastructure. The results indicate the design deterrent can increase order and perceived safety and constrain comfort and inclusivity.

After design interventions, which included controlled planting, barriers, and enhanced lighting, the perceived safety scores increased by 1.69 to 2.52, which proved the principles of Crime Prevention through Environmental Design (CPTED) (Newman, 1973). Observations in the field also indicated that lighter and well-maintained spaces had more users and less misuse.

However, all participants experienced less sociability and less comfort as a trade-off between security and openness. This justifies the argument by Kohn (2004) that defensive design limits diversity and the concept of spatial justice as forwarded by Soja (2010), which posits that there should be a fair sharing of the public space.
The various sites had different perceptions: the deterrent measures enhanced order at Dehiwala but deterred social activity, at Nugegoda they threatened informal use, whereas at Peliyagoda they enhanced emptiness. Such differences indicate that the deterrent design reception is highly dependent on the socio-economic context and the degree of activity.

Green plants, shaded seating, and proper lighting were always appreciated by respondents, which demonstrates that a safe and comfortable environment can be maintained with the help of an inclusive design. HLA, therefore, needs to be redefined as a situational and inclusive solution, to combine the CPTED principles with community-based landscape planning. This can be directed to Urban Development Authority guidelines to develop inclusive, safe, and socially cohesive under-flyover environments.

Conclusion

The paper has analysed the perceptions of the hostile landscape architecture (HLA) within under-flyover areas in Dehiwala, Nugegoda, and Peliyagoda, indicating that those designs characterised by deterrence can bring short-term sanity but undermine inclusiveness, comfort, and equity. The Sri Lankan urban setting is best served in terms of safety by virtue of openness, maintenance, and community presence as opposed to restriction. The research has given the field of HLA in the

Global South new regional evidence and has placed CPTED and Spatial Justice as two complementary models of equitable and human-centred city design.

Framework policies need to reshape under-flyover spaces into civic property by integrating CPTED principles based on inclusivity and situational adoptions into Urban Development Authority and municipal design principles. It is necessary to focus on participatory co-design, maintenance governance, and environmental quality to improve the safety and human dignity. Future studies ought to combine behavioural mapping and longitudinal studies to determine the role of inclusive interventions in reconstructing spatial behaviour and use evidence-based urban design policy.

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