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Preferences of Landscape Elements at Different Housing Typologies in Indian Context

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Abstract

Landscape elements help in enhancing the health and well-being of the people along with creating pleasant housing environment. In India housing diverges to a great extent and existing typology of housing depending on its physical appearance, bye-laws, and socio-economic profile. This paper identifies the categories of landscape elements and classifies the housing typology by literature review. In this paper, primary data of 18housing colonies from six identified housing typologies in Bhopal, India is investigated to determine the residents' preference for landscape elements. Statistical analysis of the survey data was done for the concluding result. This paper provides the residents' preference for landscape elements belonging to different housing typologies. The understanding of residents' preference shall assist architects and planners in developing housing of different typologies accordingly.

Keywords: landscape elements, health and wellbeing, housing typologies, residents' preference

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INTRODUCTION

The relationship between peoples and landscape is significant. Ulrich in his series of studies found that when people are near greenery their affective responses (blood pressure, palm sweat, etc.) are significantly lower in comparison to people residing urban environments. Ulrich's studies provide clues that nature is vital for individual well-beings.[1,2] Therefore, there is a need for architects and planners in designing housing and its environment with landscape elements that can enhance human well-being. Regarding green space and view, People living in cities that lack green spaces could have a greater preference for green spaces than residents in the countryside,[3] where they have more exposure to the natural environment. Housing environment has an impact on the development of individual and society, thus considered as a key indicator for assessing housing satisfaction of residents. According to a report of National Housing Bank;[4] housing indirectly contributes to the social, physical and psychological well-being. The stress decreases and satisfaction increases significantly of the residents when exposed to health-promoting nature and landscape values. The visual landscape is believed to affect human beings in many ways, including aesthetic appreciation and health and well-being.[5] The paper explores to understand better the preference of residents for landscape elements systematically. The aim of this paper is to present a study assessing preference of landscape elements that improve the environment in different housing typologies and enhance the satisfaction of the residents. The paper has mainly focused on the following three questions: (a) what are Landscape

elements and Classification of Housing Typologies, (b) Do Residents' preference of landscape elements varies in different Housing Typologies, (c) If yes, then what is the order of landscape elements preferences in different Housing Typologies.

The case study conducted in Bhopal city, the capital of Madhya Pradesh, India. Data were collected through questionnaire survey carried out in different housing typologies. This paper shall try to assist architects and planners in understanding preference of landscape elements by residents from different housing typologies that enrich their well-being.

METHODOLOGY

The paper analyses the residents' preference of landscape elements for their housing satisfaction. Extensive literature related to landscape elements and housing typologies were reviewed followed by primary data collection and analysis to achieve the aim of the paper. The methodology developed was distinctly divided into three stages. Figure 1 illustrates the methodology adopted for this paper. Stage One – Literature Review: Research reports, journal papers and books on landscape elements and housing typologies were reviewed. The literature was reviewed from Development plan, Building bye-laws and codes for classifying different housing typologies in India. Categorization of landscape elements used in housing development was through conferences proceedings, journal papers, and books. Stage Two – Primary Data Collection: Questionnaire survey was conducted at identified housing colonies from different housing typologies selected from Bhopal city, India. A primary survey of residents randomly selected from Electoral Voter List residing in identified housing colonies of the Bhopal city. The identified residents were requested to respond to the questionnaire by the author along with two more trained interviewers. Stage Three – Data Analysis: Primary data was analyzed through statistics with SPSS 17 software. Descriptive statistic was used to define the population and Chi-square test for determining the residents' preference for landscape elements at different housing typology.

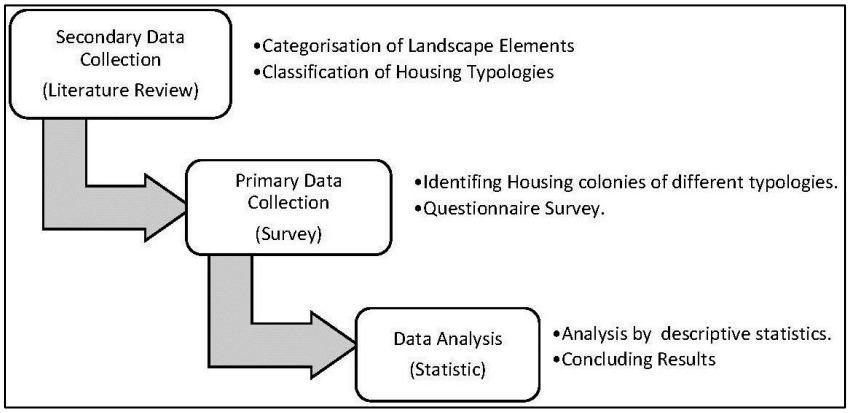

Fig. 1. *Methodology.*

LITERATURE REVIEW

The relationship between humans and the natural environment spans a broad range of concerns, from the pragmatic to the spiritual.[6] The high-quality living environment in housing colonies can be created with the help of landscape elements to meet the demands of residents like living, quiet, health to comfort, belonging, communication, neighborhood relations, and overall quality of the environment in housing colonies. The

literature varies conferences proceedings, journal papers, books, development plan, building bye-laws and codes was reviewed for Categorization of landscape elements and classifying different housing typologies in India.

Categorization of Landscape Elements

Landscape elements are essential for human health and well-being, apart from helping people in remembering the place, it also offers with emotional needs, such as that of relaxation, identification or stimulation. Landscape comprises the visible features of an area of land, including the physical elements of landforms such as mountains, hills, water bodies (rivers, lakes, ponds and sea). It comprises of living elements like vegetation, flora, and fauna. Along with living elements, it also includes built forms, structures and transitory elements such as lighting and weather conditions. The fundamental understanding of broader categories for landscape elements were referred from various books and literature like "Basic elements of landscape architectural designs,"[7,8] "Landscaping Principles & Practices," a book.[9] "Time-Saver Standards for Landscape Architecture: Design and Construction Data"[10] and "The Experience of Nature a Psychological Perspective".[6] As research works,[5,11–14] explain the environments' potentials and visual of landscape improves health and wellbeing of the human. Researchers also establish a relationship between inhabitants and their housing with blue space.[15] Analysis of[16] the visual landscape indicators and its impact on the nearby surrounding. Studies of[9,17] focus on street landscaping and its impact on housing. As evident from the literature reviewed, the essential landscape elements comprise of mainly four broad categories namely Plant Material, Water Bodies, Ground Cover and Built forms (Figure 2). The first significant landscape category was Plant Materials with primary elements like Trees, Shrubs, Herbs, Creepers and other including Water plants, Cactus, Bonsai, and Ferns, etc. The next in the tally is Water features; classified by its physical state such as Still, Flowing water, Falling, Jet and combined. Ground cover is the next significant category it has been further classified under Soft and Hard again based on the physical appearance and texture. The fourth categories, Built forms with indicators like Partitions, furniture, lighting, etc. have been identified.[18]

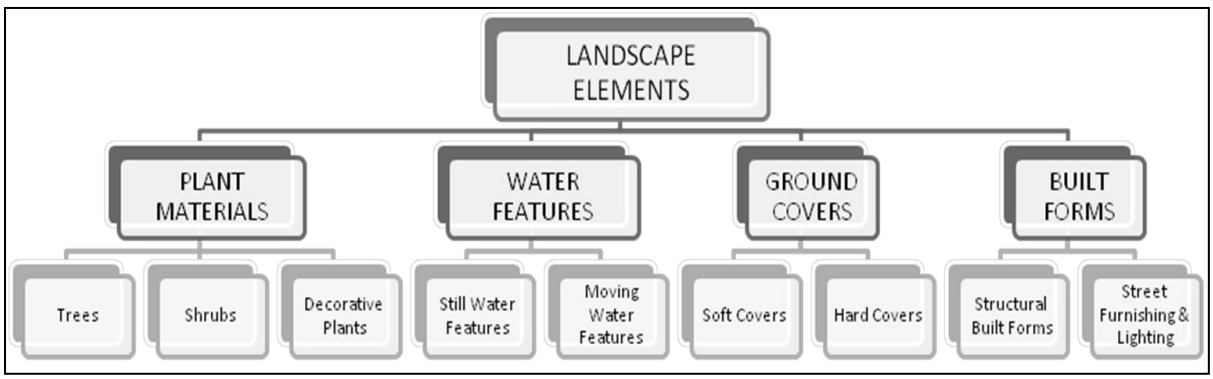

Fig. 2. *Categorization of Landscape Elements.*

Classification of Housing Typologies

In India housing diverges to a great extent and reflects the socio-economic mix of its vast population predominately existing typology of housing depending on its physical appearance, bye-laws and socio-economic profile. Houses in a large variety; a primary division are free-

standing or Single-family houses and various types of attached or multi-user dwellings. In India, it can be defined using three key parameters viz. Income level, a size of dwelling unit and affordability. It is to provide housing need for low-income people or economic weaker section of the society.[4] According to Model Building-Bye-laws (2004), the residential areas are developed either as (a) plotted development housing or (b) group housing /flatted development housing. Group Housing means a number of dwelling units on an entire plot of land, built compositely and integrally where land building are held under a level right jointly; buildings and services maintained jointly, and the construction is undertaken by one Agency/Authority/Individual.[19] The density pattern i.e. (high density, high-medium density, medium low density or low density) are followed for working out the pattern of development with respect the size of the plot to some dwelling units on each plot, setbacks, FAR and the number of storeys/height of the building. The physical housing ranges from single detached units to high-rise apartment buildings. The physical typology of housing encourages communities and developers to consider housing forms that fit well with their surroundings. Figure 3 illustrates existing housing typologies in India. The six identified housing typologies for this paper are Row housing, Semidetached housing, detached housing, Multi Storied housing, High rise housing and composite housing colonies.

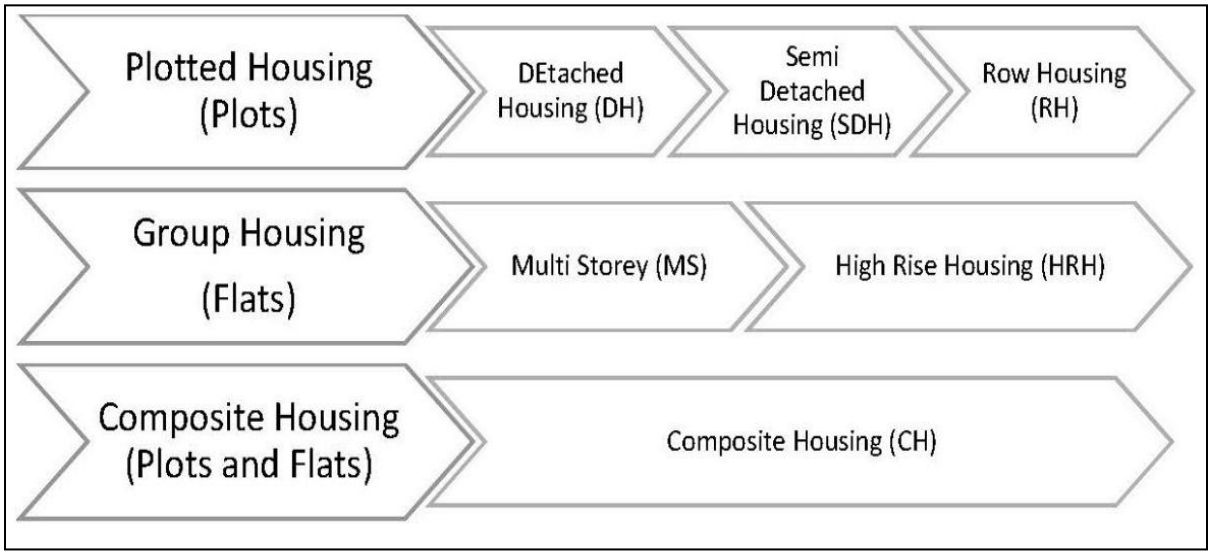

Fig. 3. *Classification of Housing Typologies.*

Primary Data Collection

Bhopal, the capital city of Madhya Pradesh, is one of the fastest growing cities India. As per 2011 census, the population of Bhopal district is 1.838 million out of which 1.435 million live in Bhopal city, in 14 zones having 787 registered housing colonies, covering a gross area of 285 sq.km. Including the lakes and hills (Bhopal Municipal Corporation March 2014). 80 housing colonies from of Bhopal randomly selected. These colonies classified as per the identified housing typology concerning literature review, i.e., Row Housing (RH), Semidetached housing (SDH), detached housing (DH), Multi Storied housing (MSH), High rise housing (HRH) and composite housing (CH) colonies. It was assumed to identify a minimum of 03 cases from each typology to build appropriate sample regarding coverage across all zones of Bhopal. 18 colonies were identified as the sample to provide the possible insights for the survey (Figure 4).

Fig. 4. *Housing Colonies of Bhopal City.*

Questionnaire

The questionnaire prepared with the objective of to understand Socio-Economic and Demographic (SED) profile of the respondents residing in different housing typologies. The questionnaire was designed with simple questions so that it can be easily understood by respondents and fetch information regarding their importance and preferences of landscape elements. Respondents were also asked rank in order of preference Landscape elements i.e., Plant materials, Water Features, Ground Covers and built forms.

Survey

Sampling helps to draw conclusions about a whole by examining a part 5% or minimum ten respondents from each housing colonies were supposed to survey for the drawing results from the electoral voter list available on the website of CEO MP Voter List Chief Electoral Officer, Madhya Pradesh to have a survey of desired minimum target population. The survey began at the 18 of October 2014 till 14 of December 2014 as this period climate is suitable in central India free from extreme summer, winter and heavy rains. The local language (Hindi) was selected for the survey during conversation and questionnaire was filled in English.

Sample Profile

A sample profile is generated using descriptive statistics for understanding the sample. 56.17 % (182) of the participants were men, and 43.8% (142) were women. Three members were in 17.28%, four members were in 27.16% families, and 29.63% (96) of the respondents had five family members, six members were in 13.27%, and rest households were of one, two, seven, eight, or nine family members. The mean family size was 4.49 persons. The average age of the respondents was 42 years; the youngest participant was 20 years old. Regarding the mean monthly

household (H-H) income of respondents was Rs 48,448 ranging from Rs 7500 to 175,000.

Primary Data Analysis

The analysis conducted by formulating hypotheses for the aim of paper. Statistical tests applied on the hypotheses for concluding the results and understanding the preference of landscape elements that improve the environment in different housing typologies and enhance health and well-being.

Relationship Between Landscape Elements and Housing Typologies

Chi-square test for independence was applied to check association of Landscape elements preference with Housing Typology with the following hypothesis: H0: Residents' preference of Landscape elements is independent on Housing Typology. H1: Residents' preference of Landscape elements is dependent on Housing Typology. Chi-Square test of independence (Pearson Chi-Square) indicates there is significant association between housing typologies and preference of plant materials χ^2 (15, n=324) = 29.474, p=0.014, water features χ^2 (15, n=324) = 9.872, p=0.828, Ground Covers χ^2 (15, n=324) = 43.870, p=0.0001 and Built forms χ^2 (15, n=324) = 47.209, p=0.0001 (Table 1).

Table 1. *Pearson Chi-Square Test for Ranking Landscape Elements with Housing Typologies*.

Landscape Elements	Value	df	Asymp. Sig. (2-sided)
Plant Materials	29.474	15	.014
Water Features	9.872	15	.828
Ground Covers	43.870	15	.000
Built forms	47.209	15	.000

Chi-square test established an association between preferences of Landscape elements and Housing typologies. Only for water features as it was least preferred landscape element; Pearson Chi-Square statistic, 2 = 9.872 and p > 0.05 indicates its independency on housing typology. Other landscape elements i.e. plant materials, Ground Covers and built forms p < 0.05 indicates their dependency on housing typology. Thus, it can be concluded that preference for landscape elements are dependent on housing typologies.

Preference of Landscape Elements at Different Housing Typologies

To assess that do residents' preference for landscape elements varies in identified Housing Typologies. The respondents from six identified housing typologies were supposed to rank in order of their preference top to bottom all four categories of landscape elements: Plant materials, water features, Ground Covers and Built forms.

Cross tab analysis was conducted between identified housing typologies and landscape elements. In Table 2 bold numeric figures represents the maximum percentage of respondents Housing typologies wise ranking of landscape elements based on Crosstab analysis. First preference has been given to Plant materials by 47.1% respondents' from row housing. However, ground covers have also been given first preference by 38.8%

respondents' in the same category. Interestingly 30% respondents' from high-rise housing gave their first preference to plant material and built forms. Second preference has been given to ground covers from all the housing except row housing. Second preference by 46.9% respondents' from multistoried housing has been given to ground covers, whereas 36.4% of respondents in the same category gave second and third preferences to build forms. Third preference is given to build forms from all the housing except high rise housing. Fourth preference was given to water feature by all respondents' from each housing typology.

Table 2. *Housing Typologies Wise Ranking of Landscape Elements Based on Crosstab Analysis.*

Detach Housing				
Rank	1	2	3	4
Plant Materials	61.4%	25.0%	9.1%	4.5%
Water Features	9.1%	15.9%	15.9%	59.1%
Ground Covers	27.3%	50.0%	15.9%	6.8%
Built forms	2.3%	9.1%	59.1%	29.5%
Semi Detach Housing				
Rank	1	2	3	4
Plant Materials	71.9%	15.6%	7.8%	4.7%
Water Features	6.3%	14.1%	21.9%	57.8%
Ground Covers	12.5%	35.9%	29.7%	21.9%
Built forms	9.4%	34.4%	40.6%	15.6%
Row Housing				
Rank	1	2	3	4
Plant Materials	47.1%	23.5%	21.2%	8.2%
Water Features	7.1%	11.8%	16.5%	64.7%
Ground Covers	38.8%	31.8%	21.2%	8.2%
Built forms	7.1%	32.9%	41.2%	18.8%
Multi Storied Housing				
Rank	1	2	3	4
Plant Materials	48.5%	15.2%	21.2%	15.2%
Water Features	9.1%	7.6%	16.7%	66.7%
Ground Covers	31.8%	40.9%	25.8%	1.5%
Built forms	10.6%	36.4%	36.4%	16.7%
High Rise Housing				
Rank	1	2	3	4
Plant Materials	30.0%	20.0%	25.0%	25.0%
Water Features	5.0%	10.0%	40.0%	45.0%
Ground Covers	35.0%	45.0%	20.0%	0.0%
Built forms	30.0%	30.0%	15.0%	25.0%
Composite Housing				
Rank	1	2	3	4
Plant Materials	60.0%	22.2%	8.9%	8.9%
Water Features	6.7%	13.3%	22.2%	57.8%
Ground Covers	22.2%	62.2%	11.1%	4.4%
Built forms	11.1%	2.2%	57.8%	28.9%
Housing Typology	Ranking of Landscape Elements			
	Plant Materials	Water Features	Ground Covers	Built Forms
Detach Housing	I	4	2	3
Semi Detach Housing	1	4	2	3
Row Housing	1	4	1	3
Multi Storied Housing	1	4	2	2,3
High Rise Housing	1	4	2	1,2
Composite Housing	1	4	2	3
Number (%) of respondents from identified housing typologies in order of preference	Landscape Elements			
	Plant Materials (First)	Water Features (Fourth)	Ground Covers(Second)	Built Forms(Third)
	178 (53.7%)	197 (60.8%)	136 (41.9%)	140 (43.2%)

Housing typologies wise ranking of landscape elements based on Crosstab analysis concludes that first preference of all the respondents was Plant materials with 178 (53.7%) respondents. Second preference was Ground Covers with 136 (41.9%), third preferred was built forms with 140 (43.2%) respondents, and last preference was water features with 197 (60.8%) respondents keeping it in the fourth rank.

CONCLUSION AND DISCUSSION

The paper categories Landscape elements namely Plant Material, Water Bodies, Ground Cover and Built Forms and Classification of Housing Typologies in Row housing, Semidetached housing, detached housing, Multi-Storied housing, High rise housing and composite housing colonies. The paper also establishes that Residents' preference of landscape elements varies in different Housing Typologies. The resident's preferences in order of one to four are Plant materials, Ground Covers, Built Forms and Water Features respectively. Plant materials have been given first preference by residents as presence of plants, vegetation and greenery gives them pleasure as well as they enhance their health and well-being. Ground covers have been given second preference, as according to residents maintained Green Space, Segregated Circulation for pedestrian and vehicular Traffic. Built forms have been given third preference by residents as a good street furniture, Tot lot with swing and various activities for children is not possible to possessed by everyone in their own house, thus their presences as the common facilities along with the housing can be exploited to some extent. Water features have been given fourth preference and lastly ranked by residents. As residents exclaimed though water features give pleasant, cool and refreshing feeling the maintenance of water features is sometimes crucial at housing level. To create pleasant housing environment landscape elements play crucial role, it does help in enhancing the environment as well as resident's housing satisfaction. The preferences of Landscape elements vary according to housing typologies. Housing is a part of a larger Landscape we live in, rather and the creation must adhere to the betterment and enhancement of the same in a holistic planned/designed manner. Good urban planning with consideration of residents' preferences of landscape elements in identified housing typologies is essential for creating pleasant housing environment of a green city which has both aesthetic beauty and enhances residents' health and well-being. Against this background and as an important element in urban areas for housing development, 'landscape elements' should be taken as a primary consideration by architects and planners for the new development. The ranking of residents' preferences suggested in the paper may help both researchers and practitioners like Architects and planners for analyzing the choice of landscape elements with housing typology wise.

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