Samarawickrama, Sumanthri, et al (eds), 2019, "Re-evaluating Space across disciplines"*: Proceedings of the 12th International Conference of Faculty of Architecture Research Unit (FARU), University of Moratuwa, Sri Lanka, December 03, 2019 Colombo* pp. 223–230. ©

IMPACT OF VISUAL LANDSCAPE CHARACTERISTICS OF URBAN WATERSCAPES ON THE CITY IMAGE: *A Study of Sri Jayawardenepura Kotte*

RANATUNGA M.K. [1] & HERATH H.M.K.D. [2]
[1, 2] Department of Architecture, University of Moratuwa, Moratuwa, Sri Lanka
[1]ranatungamk96@gmail.com, [2]kavi_dh@yahoo.com

Abstract
Over many centuries great civilizations are inspired by water and it has contributed to both natural and man-made environments. Water- based urban environments are combining natural scenarios and aesthetic qualities of water in order to create urban spaces. Urban waterscapes are there to celebrate the role of water in a water- based environment. A positive image of a water- based city environment can be identified through a visual landscape character assessment. Objective of the research focused to find visual landscape character indicators of urban waterscapes and those were used to evaluate the dependency of spatial memory recall on the water- based city imageability. Diyatha Uyana water Front Park, Parliament lakeside and Kimbulawala urban paddy field urban spaces were selected as case studies since they are identified as urban waterscapes within Sri Jayawardenepura kotte. Quantitatively collected data used to qualitative data analysis and aquaphilia based hypothetical question were taken into investigate the applicability of water- based imageability in a city landscape. Field study was carried with thirty participants and using a questionnaire survey and a Photo Projective Method place identification. Findings demonstrated that the visual scale parameters of urban waterscapes mostly influence on the identity of water- based city image.

Keywords*: Urban waterscapes; Visual landscape character; City image in water-based environment.*

1. Introduction

Ancient city planning and landscape tradition in Sri Lanka possibly adopted with integrating the aesthetics of nature while creating built environments. During the settlement process, man- made environment was dominated by the 'Wewa' and paddy field landscape since traditional tank-based villages had a specific environmental character with a strong cultural fabric. The "Wewai Dagabai Gamai Pansalai" concept was derived to create a great sense of interrelationship with the natural systems of the environment. Water is an asset for many cultures, and it gives birth to human as well as many civilizations. Water and watery contexts contributed to a considerable level of townscapes by involvement of people's actions, events, memories and myths. The city landscape have an ambience for a sensory quality or character that public can quietly feel (Nasar, 1998).

1.1 BACKGROUND OF THE STUDY

Water resources in an urban context play a vital role for treatment and engaging people with the pleasures of water. People are mostly preferring to the areas where water bodies are presented in their recreational activities (Smardon, 1988). "A water surface with visual quality will be capable of attracting large set of people. The fascinating and impressive visual quality of water landscapes has the ability of attracting people to the water element and the formed surrounding" (Bulut & Yilmaz, 2008). It is believed that the visible landscape affects the human beings, from such ways as aesthetic appreciation, health and well- being (Velarde et al., 2007). Therefore, the visual landscape assessment becomes more important in the designing and planning of landscapes and landscape elements accordingly. Visual data will be also helpful sustainable planning and development in an aesthetic landscape (Krause, 2001).

Current trend of recreational uses in urban spaces with the emergence of cultural and eco-tourism practices can be identified as a positive approach towards the sustainability of urban environments. The issue addressed as the lack of visual amenity in urban environments and how it can be improved with the use of visual landscape characteristics of urban waterscapes and its contribution to the perceived city image by residents and visitors.

1.2 OBJECTIVES AND CONTRIBUTION OF THE STUDY

The use of water resources in land use is an important aspect of urban and rural landscape planning and design (Bulut & Yilmaz 2008). Therefore the main intention of the study is to explore that how to integrate the visual landscape characteristic of urban waterscapes in a water- based environment. People respond to their environment that appears and open before their inferences and derive from visual cues to recall a memory of a place. It seems that places have different memories. The shaping or reshaping of cities should be guided by a "visual plan": which is about a set of recommendations and controls which

would be concerned with visual form on the urban scale (Lynch, 1960). Final objective of such a plan will be an image in the mind from which it reflects the ultimate goal. Accordingly it will be useful to improve an image by training an observer to look at a city.

Hence, the objectives of the research are,

- To identify visual landscape characters of urban waterscapes in a water- based city environment.
- To find out the most influential visual landscape characters of urban waterscapes on the water-based city image

Findings of the research, would be helpful for Landscape Architects and Urban Planners to integrate urban water element in an appropriate manner in the city planning and development. Because it is important to incorporate aesthetic considerations in urban spaces to enhance the sense of belonging in a city context while promoting a visually pleasing built environment with a particular city identity.

1.3 RESEARCH GAP

Pouya & Behbahani (2017) cited that visual landscape assessment is a key factor of decision processes of landscape architecture and landscape planning. The assessment allows the integration of local perception towards the surrounding and creates a sense of belonging and identity of future planning developments (Rosley et al., 2013). Research on environmental preferences mostly focused on natural or rural environments. There were several researches on urban landscape preferences due to the reasons of urban complexity with the structure of the urban form. Because of that, it is a bit difficult to assess the landscape preference factors in urban landscapes (Kaymaz, 2012). This research was conducted to fill the knowledge gap of visual landscape attributes in a city context, to address the requirement to evaluate the impact of visual preferences of urban water bodies on the city identity with a particular city image.

1.4 SCOPE AND LIMITATIONS

Sri Jayawardenepura Kotte city was selected as the major case study area due to its location, availability of natural waterways and the nature of that region with the exist large green belt in Kotte. Built fabric of Kotte city and natural waterways that formed with Diyawanna oya and marsh, functioning symbiotically as a key characteristic of a water- based city environment. It is the current capital of Sri Lanka and it provides administrative services to the country. The combination of built fabric and water provides sufficient urban spaces which combining natural scenarios and aesthetic qualities.

Research scope was finalized to do the assessment by comparing three types of waterscape characteristics in a particular water- based environment. Public open spaces which emerges with dominant waterscapes characteristics were selected to the assessment in Sri Jayawardenpura Kotte city. Then, Diyatha uyana Rectreational Park, Parliament lakeside and Kimbulawala urban paddy field sites selected as the potential urban spaces for the assessment.

2. Theoretical background and theoretical framework

2.1 VISUAL PERCEPTION AND VISUAL LANDSCAPE CHARACTER ASSESSMENT

Bell (1999) described that, “Sight is a particularly important sense for humans to which we have become evolutionarily adapted. It has also become one of the main ways in which we think, and use the ‘mind’s eye’ to picture creative ideas like we use our real eyes to picture our environment”. Porteous (1996) discussed about that the spatial information which we receive through our senses as seeing, hearing, smelling and feeling. Among them sight is the most valued sense because more than 80% of our sensory recognitions happen through the sight. Therefore, to provide necessary guidance for visual landscape designs, theories related to visual perception and landscape aesthetics will be presented (Kaymaz, 2012).

Ode et al. (2008) defined landscape visual character as a visual expression of the spatial elements, structure and pattern in the landscape. Moreover, visual landscape assessment was defined as the process which contribute to analyze the visual landscape character. Pouya & Behbahani (2017) referred, visual landscape assessment is a key factor of decision processes of landscape architecture and landscape planning. Such assessments provide clear data of the landscape structures as land form, color, water surface and green elements (Tveit et al., 2006).

2.2 CITY IMAGE IN A WATER- BASED ENVIRONMENT

Various early human settlements initiated in closeness to surface water bodies (Hampton, 2002;

Hooimeijer, 2011). This desired factor possibly can be extent to symbolize that, water- centric environment as a subset of water- based environments where water is intentionally integrated within urban fabrics as an extensive urban design element. Water as a fundamental landscape element, functionally important aspect for the way finding and as characteristics of water-based spatial anchors to promote the acquired human attachment to water-centric environments (Rising, 2015).

2.2.1 Urban Waterscapes

Rising (2015) mentioned that, historically there are flood prone water cities that adopted to a water-coherent approach such as, Yellow river basin of China (Yu, Lei, & Dihua, 2008) and Angkor Wat in Cambodia (Shannon & Manawadu, 2007). So far most of these water cities have been popular with their original hydrological functions of waterscapes. Systematic integration of waterscapes, including a large body of water within the city limit, a moat or lake along the city perimeters, or an interconnected network of canals, ponds and wetlands for flood retention, conveyance and groundwater recharge are some of the characteristics of such water urbanisms.

Periyasinaki (2010) defines urban waterscapes as ecologically and culturally designed spaces that people embrace in the natural process and aesthetic qualities of water in an urban context. Waterscapes create and develop a consciousness of people through a link between nature and culture of a place. Most of the waterscapes are constructed water features in public open spaces and they have a great impact on an urban landscape by providing experiences of water qualities through touching, sighting and hearing. Peoples' preferences of water as an aesthetic feature, movement patterns of water and its forms correlation with urban waterscapes strengthen people's sense of belonging in urban open spaces.

2.2.2 Water- based imageability

Imageability refers to the ability of a landscape to present a strong visual image in the observer and making landscapes distinguishable and memorable. Tveit et al. (2006) covers a range of synonyms with relates to theories such as spirit of place (Bell, 1999), genius loci (Lynch, 1960), vividness (Liton, 1972) and topophilia (1974) for the concept of imageability. Lynch (1960)'s study focuses on the connection between imageability (the 'identity' of a landscape) and cultural or personal identity. His works acknowledge that, the identity of a landscape can support and develop cultural or personal identity for the people in living area.

Lynch (1960) discussed the cognitive images of cities by using imageable cities like Venice and Dutch polder cities and suggesting that the urban environment is known as a structure of landmarks, nodes, paths, edges and districts. His results explicit that imageability of water- based cities have well-integrated water bodies within the urban fabrics and have more water- based salient spatial anchors with canals or water- based paths or narrower linear water surfaces rather than, rivers or water- based edges (Rising, 2015).

Figure 1, Blue- green network of the Sri Jayawardenepura Kotte city

2.3 RESEARCH HYPOTHESIS

Rising (2015) explicate 'aquaphilia' as a timeless place- making concept, which significantly motivated from the affection for water, from the Latin aqua for water and philia for love from ancient Greek word. Aquaphilia concept is emerged with the eco- centric perception and a potential factor which provides a safer loci of attachment due to the instinctual human affection towards the water or water- based environments.

It is such a foreseeable reaction to specific water- based aesthetics coupled with subsistence-based advantages in an urban environment, where the perceptions of scenes contain clean and safe waters.

Moreover, 'aquaphilia' is based on such a kinship attachment with genetically familiarized notion as human instinctual attachment to survival enabling water" (Rising, 2015).

A research hypothesis was used to assess the applicability of water- based imageability in a city landscape. The study assumes on the aquaphilic aspect of human preferences in the landscape because people develop their mental image/ identity in a water- based landscape due to their innate tendency towards water and water-based environments. Accordingly, approach of the theoretical framework assumes that it would- be applicable in a water- based environment.

2.4 THEORETICAL FRAMEWORK

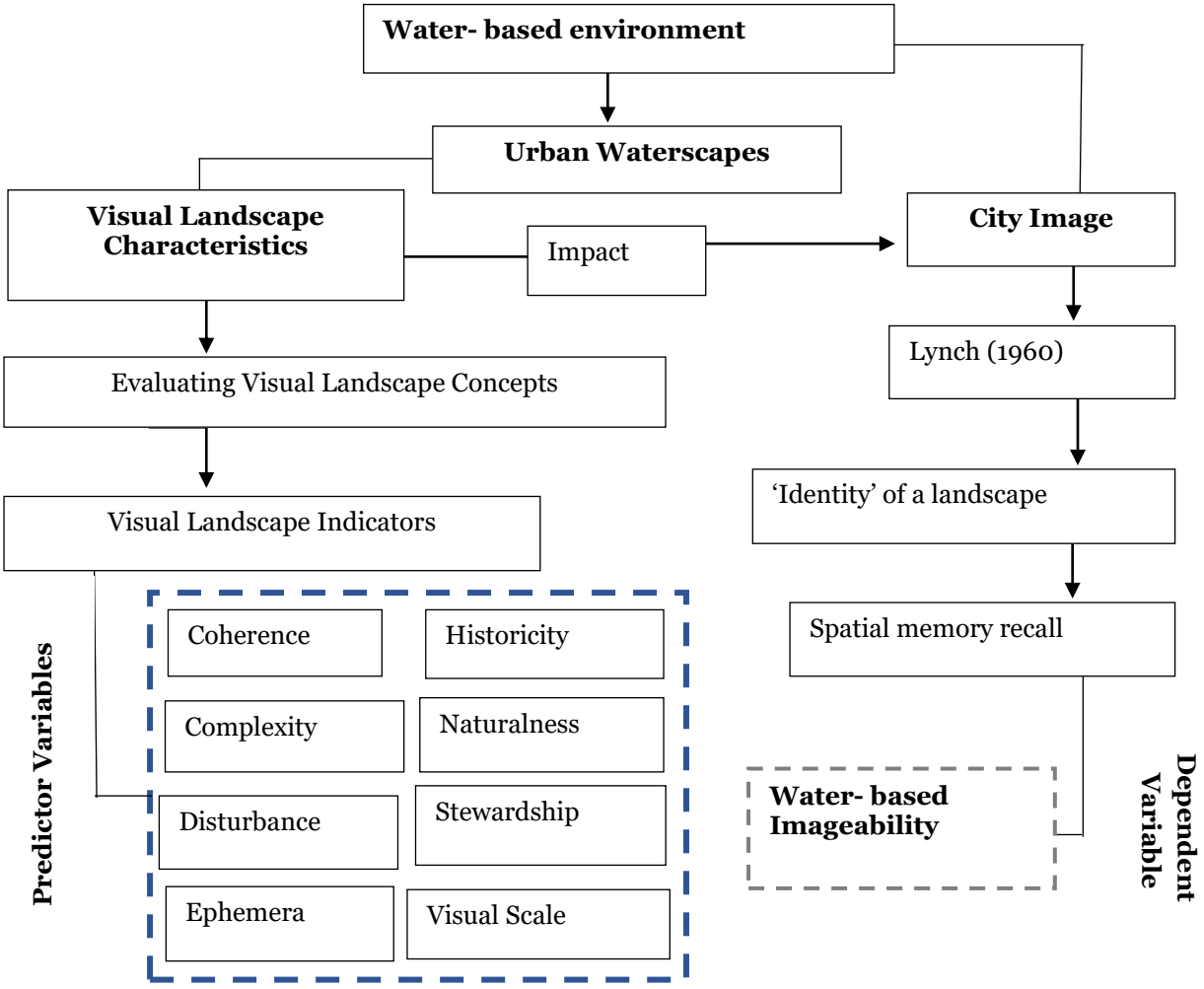

Figure 2, Theoretical Framework (*Source: Ranatunga M*)

3. Research design

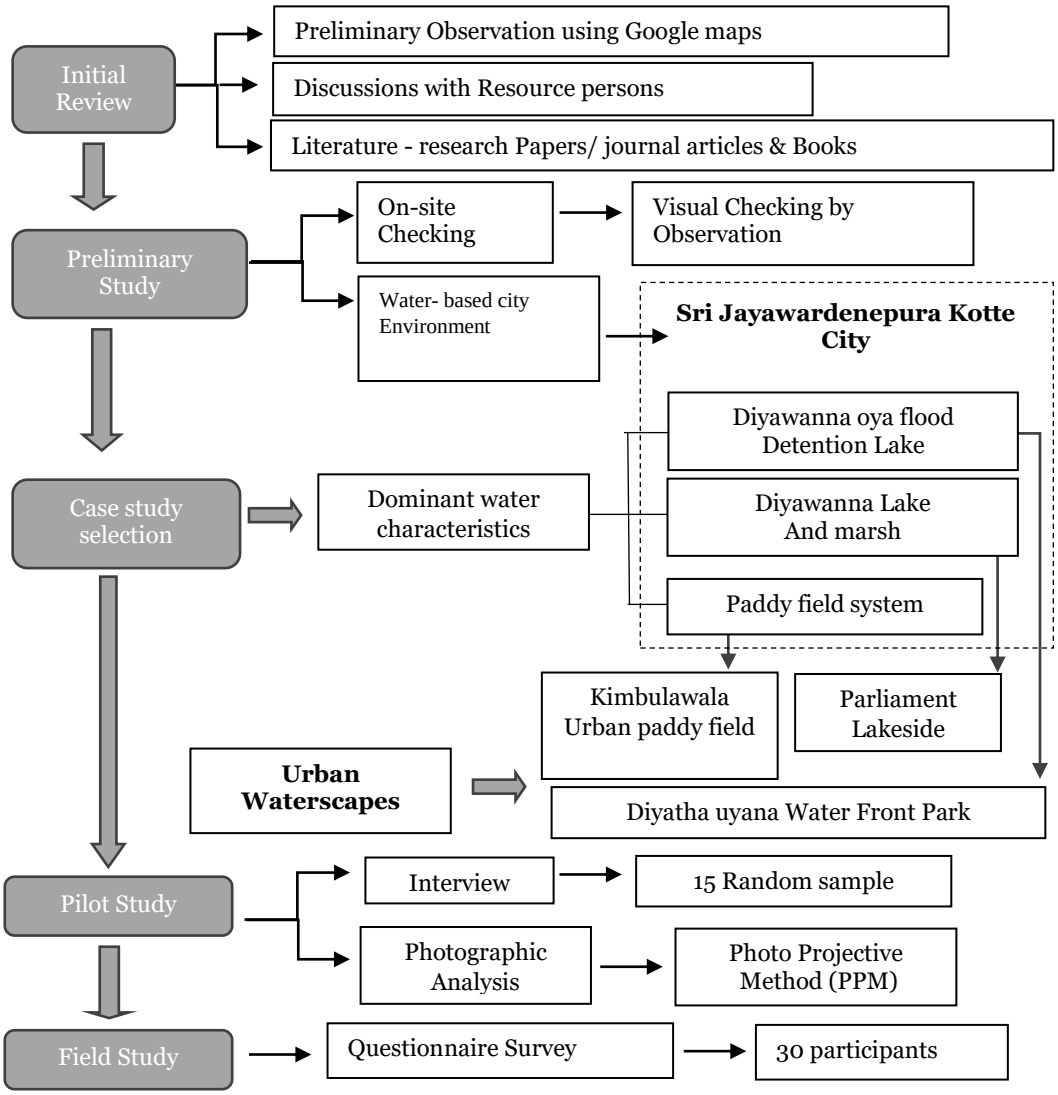

Figure 3, Research Design (*Source: Ranatunga M*)

4. Method of the study

Method of this study based on a public perception based approach conducting a visual landscape quality assessment, focused on visual perception which has been based on a method, because human perception is mainly based on visual simulation.

Research study conducted among inhabitants and visitors of the city to collect quantitative data and qualitatively analyzed that data to figure out the positive and negative outcomes of the study. Field survey was conducted to investigate the applicability of the theoretical framework on the city image of Sri Jayawardenepura Kotte. Thirty participants were selected to the field study in the age group of 20- 29 years. They were from same ethnic group and same region of the country. In this study, age, education level, cultural background and ethnicity were considered constant, while gender base participation was disregarded.

4.1 DATA COLLECTION PROCEDURE

Identified theory based eight visual concepts (coherence, complexity, disturbance, ephemera, historicity, naturalness, stewardship and visual scale) used as predictor variables of the study in order to evaluate the dependency of spatial memory recall (imageability) in a water- based city environment. Visual concepts were converted into 24 measurable visual character indicators for the easy understand of people and used to find most influential factor of urban waterscapes on the city image.

Table 1, Visual concepts converted to identifiable parameters for the easy understand of majority of people (*Source: Ranatunga M*)

Visual Concept	**Dependencies derived from the literature (Ode et al., 2008)**	**Measurable parameters of the visual landscape indicators of urban waterscapes (Predictor variables)**
(from literature)		**(compiled by author)**
Coherence (1)	Presence of water correspondence with the land form, water location and natural condition	Appropriateness of the water body location with the land form and vegetation arrangement in the city (Fact 1)
	Repetition of patterns across the landscape	Water flowing patterns (Fact 2)
		Colors of the water due to the reflection of surrounding environment (Fact 3)
Complexity (2)	Richness of landscape elements	Richness of water- vegetation combination of the city (Fact 1)
	Diversity of elements in the land cover	Varieties of water body find in the city (Fact 2)
	Shape and size variations of landscape elements.	Shape and size variations of water bodies in the city (Fact 3)
Disturbance (3)	Landscape elements classified as disturbing	Visual barriers to the water body scenery (Fact 1)
	Area visually affected by disturbance	Visual disruption occurred due to urban infrastructures (electricity wires/ cables; pipe lines) (Fact 2)
	Visibility of disturbing elements.	Disturbance for the water body scenery due to color contrast of the built environment (Fact3)
Ephemera (4)	Presence of water which projected and reflected environmental images	Color changes of the water (Due to sky reflection on the water or reflecting vegetation colors on the water) (Fact 1)
	Water with seasonal changes	Seasonal changes of the water mass (during flood/ dry periods) (Fact 2)
	Presence of water with weather characteristics.	Water ripples & waves due to wind action (Fact 3)
Historicity (5)	Presence of traditional land use and pattern	Nature transformation of water- based environment (Ancient paddy field lowland green belts convert into urban development) (Fact 1)
	Spatial arrangement of natural elements	Proportion of water features in the city (Such as canals, lakes, river, wetlands/ paddy fields) (Fact 2)
	Density of cultural elements	Cultural value of the water- related places (Fact 3)
Naturalness (6)	Proportion of natural vegetation with the presence of water	Water- vegetation combination (Fact 1)
	Level of succession with the presence of natural features	Integration of the natural character with the city character (Fact 2)
	Shape of edges	Natural arrangement/ shape of the water margins (Fact 3)
Stewardship (7)	Management type and frequency	Clarity of the city landscape (Fact 1)
	Condition/ maintenance of structures	Maintenance of water- related urban places (Fact 2)
	Presence of weed	Proper care of water- related urban places (Proper waste disposal) (Fact 3)
Visual Scale (8)	Proportion of open land	Proportion of water mass as compared to urban elements (Fact 1)
	Depth of view	Visibility of the distant views across the water area (Fact 2)
	View shed size/ shape	Size and shape variations of water bodies as compared to build elements (Fact 3)

5. Data Findings and discussion

Overall findings of three case study spaces considered to generate an overall city image in a water- based city environment. Overall findings of three case study spaces considered to generate an overall city image in a water- based city environment. Figure 4 and 5 shows the influence of the visual landscape indicators related imageability parameters of urban waterscapes on the overall city image.

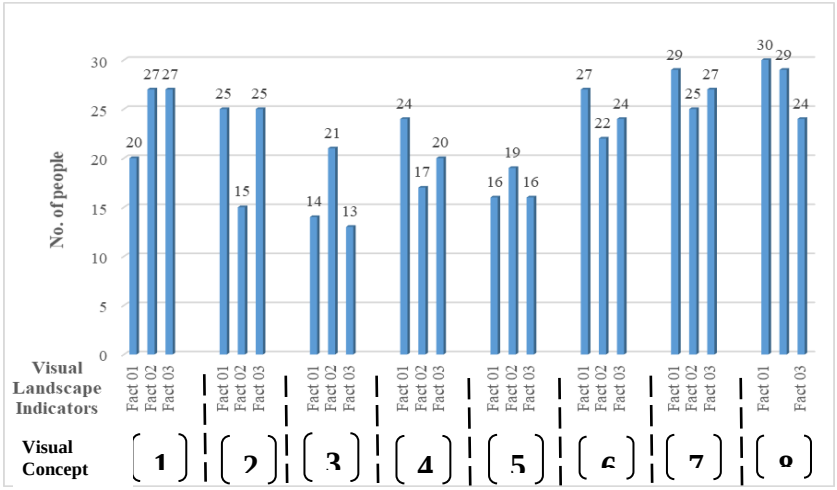

Figure 4, Fluctuation of visual landscape character indicators on the water- based city image (Separated into visual concepts) (Source: Ranatunga M)

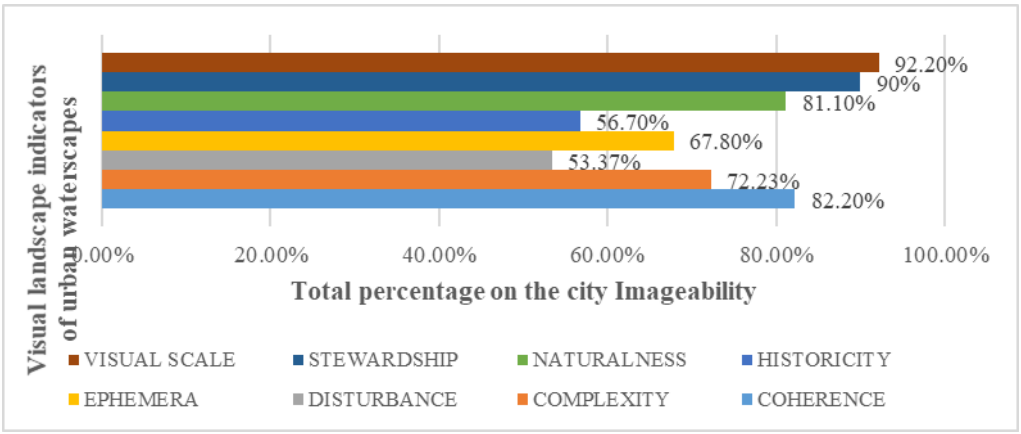

Figure 5, Visual landscape indicator fluctuation on the overall Sri Jayawardenepura Kotte city image (Separated into visual concepts) (Source: Ranatunga M)

According to the results, 92.20% of participants voted for the visual scale, 90% of participants voted for the stewardship, 82.20% participants voted for the coherence, 81.10% of participants voted for the naturalness, 72.23% of participants voted for the complexity, 67.80% of participants voted for the ephemera, 56.70% of participants voted for the historicity, 53.37% of participants voted for the disturbance. Visual concept predictor variables are fluctuating as this way,

Visual scale > Stewardship > Naturalness > Coherence > Complexity > Ephemera > Historicity > Disturbance,

Findings reveal that 'visual scale' related visual landscape indicator parameters have a remarkable influence on the city image of Sri Jayawardenepura Kotte and the city image is dominant with the 'visual scale' related waterscape parameters.

Disturbance is the least impacted visual parameter on the city image because disturbance related visual landscape indicator factors have a least impact on the study.

Overall findings demonstrated that the idea of 08 visual concepts and their indicator predictor variables perform together to bring a particular city identity to the Sri JayawardenepuraKotte. People would

prefer and appreciate the combination of water, vegetation and built fabric of the city and clarity in the overall landscape.

6. Conclusion

Environmental image of a water- based city environment can be identified through a public perception based approach, conducting a visual landscape character assessment. Study objects are focused upon identifying most influential visual landscape characters of urban waterscapes on the city image. Therefore, theory based eight visual concepts, coherence, ephemera, naturalness, complexity, visual scale, disturbance, stewardship and historicity were identified as the predictor variables and converted to the identifiable 24 visual landscape indicator parameters and used to evaluate the dependency of spatial memory recall (imageability) in a water- based environment.

Research hypothesis was used to assess the applicability of water- based imageability in a city landscape. Based on the aquaphilic aspect of human preferences in the landscape, this study assumed that people develop their mental image/ identity in a water- based landscape due to their innate tendency towards water and water- based environments. According to the hypothesis, the study assumed that the approach of theoretical framework and consequential visual landscape character parameters would be applicable in a water- based city environment.

The study presented that 08 visual concepts perform together to bring a particular identity while visual scale has a significant influence on the city image. Visual scale related indicator parameters are emerged with,

- Proportion of open land (Proportion of the water mass in the waterscapes as compared to other urban elements),
- Depth of view (Visibility of distant views across the water surface),
- View shed size/ shape (Size and shape variations of the waterscape (water body) as compared to the built elements).

Analysis of the study adduced that these 03 parameters collaborated to the dominance of visual scale related factors of urban waterscapes on the city imageability.

This research was conducted to fill the knowledge gap of visual landscape attributes in a city context, to address the requirement to evaluate the impact of visual preferences of urban water bodies on the city identity with a particular city image. Then the study was used to prove the influence of the identified visual concepts on the overall city image of Sri Jayawardenepura Kotte. The research study addressed the research problem as the lack of visual amenity in urban environments and how it can be improved with the use of visual landscape characteristics of urban waterscapes and its contribution to the perceived city image by residents and visitors. Findings emphasize the importance of a unique identity of the city image.

This study does not encompass the overall landscape preferences on the city imageability, since the study mainly focus upon the visual landscape preferences of urban waterscapes. Also the study is mainly focused on a perception based approach that depends on respondents' comments and behaviors of the landscape quality interaction. Perception based studies are mainly impacted by age, gender, education level, cultural background and ethnicity etc. In this study, the parameters such as age, education level, cultural background and ethnicity were constant, while gender base participation was disregarded. Therefore it is better to consider the aforementioned parameters for further researches to assure the overall impact on the city imageability by visual landscape preferences of urban waterscapes.

1. References

Daniel, T. C. 2001, *Whither scenic beauty? Visual landscape quality assessment in the 21st century*. Landscape and urban planning
Kaymaz, I. 2012, *Landscape Perception*. (M. Ozvayuz, Ed.) Landscape Planning
Lynch, K. 1960, Image of the city, England: M.I.T. press.
Ode, A., Tveit, M. S. and Fry, G. 2008, *Capturing Landscape Visual Character Using Indicators: Touching Base with Landscape Aesthetic Theory,* Landscape research
Rising, H. H. 2015, *Water urbanism: building more coherent cities*.