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THE VISUAL CHARACTERISTICS OF RAILSIDE LANDSCAPE FOR TOURISTS' SATISFACTION

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Abstract: Moving Landscape Aesthetic Quality (MLAQ) has been a topic that had taken less attention from the researchers. Though a great effort is given to interpret the aesthetic quality of the landscape, the tourists' preference for the moving journey has not been much talked about. The objective of this research is to study the Independent and interdependent moving Railside landscape character through landscape indicators, which is found by considering the tourist satisfaction. This paper gives important information on human landscape preference (perception) which will add value to the moving railway landscape. The study is based on seven landscape indicators (coherence, disturbance, complexity, mystery, naturalness, Imageability, and visual scale). Colombo Fort to Badulla railway landscape experience is investigated with a sample of thirty participants. Data was collected based on an online questionnaire survey with quantitative and qualitative data. Six case studies were selected for the survey by analyzing the overall result of the areas by considering the geomorphology and the spatial character of the landscape. Findings revealed that the moving landscape character of the railway journey inspires the tourist satisfaction.

Keywords: *moving landscape, tourist satisfaction, landscape indicators, rail side landscape, landscape character*

1. Introduction

Landscape architects and land planners are concerned about the visual quality and the experience of the landscape. Research and predictions on the adverse effects of the landscape are essential tools in a good landscape design. Visual vulnerability is the term adopted here for inherent resistance or susceptibility to degrading visual impacts (Brothers, 1895). Landscape elements and their character have undergone many physical and visual changes with the effects of economic, social, and cultural context. Some landscapes show a suspicious change in their character and elements before showing and realizing the specific source of impact.

The problem in Sri Lanka is its lack of knowledge on the aesthetic quality and the visual quality assessments which is done considering the users of those landscapes. Even though we get any information regarding the visual quality and the user perceptions, this information shows isolation in the field. The presence of well-combined information will lead to a better understanding of the redevelopments, relocations, conservations, and planning levels. This research will lead to one specific branch in landscape architecture which is to study the tourists' perception of Railside landscapes.

passenger transportation which run through outstanding landscapes, mountains, cultures, and different geographical patterns from Colombo to Badulla. The tourists' body senses the landscape as it moves through them. This paper discusses how the tourist is satisfied with the landscape character and a base to appreciate the moving landscape character.

There are two main dimensions of the tourism geography as the landscape and tourism. Landscape is defined in some places as a result of physical, biological, and social connectivity (Gkoltsiou and Terkenli, 2012). The landscape satisfaction in tourism related researches is done on the perceptual dimension of the landscape instead of talking of its visual character quality component. Railway journey with views and vistas outside the window drags the curious attention of the passengers towards the past, the future and about the present passing scenes. Experience can be defined as an episode or a length of time that one individual go through (Hassenzahl, 2010 as cited in Oliveira *et al.*, 2017), involving tangible perceptions through our senses and also feelings and thoughts. "Of the five senses - sight, smell, taste, hearing and touch, the sight has so far dominated marketing practice". The connectivity between sight, hearing and touch makes a perfect combination in a moving landscape journey with changing land morphologies. The specialty in the train journey is that we see the moving object and also, we feel the movement. The average distance from Colombo fort to Kandy is 115 km and it takes about four and half hours to travel, given an average speed of 25.5

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Kmh^{-1} (7ms^{-1}). The average distance from Kandy to Badulla is 117 km but it takes 6 - 7 hours of travel, given an average speed of 16.7 kmh^{-1} (4 ms^{-1}). The train takes more time on travelling highlands giving the tourists more opportunities to enjoy the landscape.

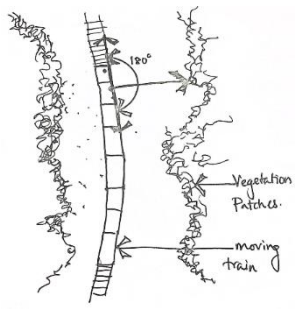

Figure 1: Tourist's visual range (*Source: Drawn by Author)*

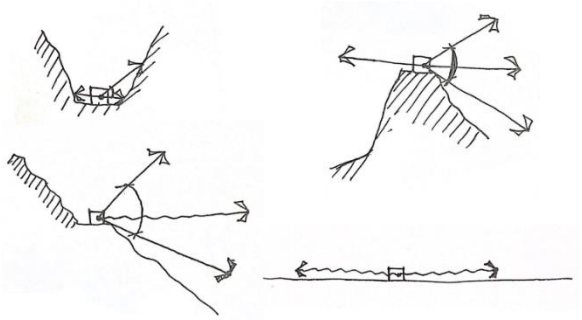

Figure 2: visual angle changes with the geo morphology *(Source: Drawn by Author)*

Kandy to Badulla railway landscape covers all three peneplain of Sri Lankan geomorphological levels as; Lower peneplain: 0 m - 125 m from mean sea level, Middle peneplain: 125 m - 750 m from mean sea level, Highest peneplain: 750 m - 2500 m from mean sea level. When covering the above 3 peneplain within a short period of 12 hours, it gives the tourist a sudden sensation in the change of atmosphere and the temperature levels.

2. Landscape aesthetic theory and evaluation of moving landscape preference through landscape indicators

Mari s. Tveit in his book, "capturing landscape visual character using indicators: touching base with landscape aesthetic theory", presents a way where the landscape visual character can be captured using theory-based concepts related to landscape perception. There are nine concepts which characterize the visual landscape. They are: complexity, coherence, disturbance, stewardship, imageability, visual scale, naturalness, historicity, and ephemera. "However, there is a lack of systematic studies which test for relationships between visual indicators and landscape preference" (a. Ode et al, 2008). Further, reviewing visual landscape quality adds more information towards this field, while adding value to the people placed in different landscapes. In relation to the study, 6 concepts are being selected out of 9. Coherence, disturbance, complexity, imageability, visual scale, and the naturalness. Furthermore, mystery is added to the research as indicators of landscape preference. "Landscape indicators provide possibilities for a more objective based method for identifying landscape character through dividing the totality of our visual perception of the physical landscape into quantifiable characteristics." (a. Ode et al, 2008). These 6 concepts of visual preference are being used to describe various landscapes in the moving journey rather than presenting a numerical value to the visual quality. The indicators which are used to analyse these concepts of landscape character will ease the process of understanding the nature of landscape change in the travel journey, and thereby the impacts of the changes on the visual qualities of the landscape. This ideology is based on the connectivity between above mentioned landscape preference concepts and the landscape theories (table 1)

Table 1: Landscape Indicators according to concepts in Landscape aesthetic theory. (Source: Compiled by Author)

Theory	Concept	Landscape indicators
Biophilic theory	Disturbance	Unpleasant visuals
Information processing theory	Complexity	Landform diversity
Prospect and refuge theory	Visual scale	Visual presentation
Restorative Landscapes	Naturalness	Natural Stress releasing Familiarity
Spirit of place	Imageability	Uniqueness Memorable
Information processing theory	Coherence	Presence of water
Information processing theory	Mystery	Surprises

3. Application and analysis of theories and methodology

The geo morphology divides the 16 areas into three as the low land, middle land and high land. All the places that are mentioned in the comparative analysis (Table 2)

Table 2: Comparative analysis of the railway journeys different landscapes. Source: Compiled by author

	Coherance.	Disturbance.	Complexicity.	Mistery.	Naturalness.	Immageability.	Visual Scale.	Temperature comfortability.	development.			Origin.		Natural Environment.			function of geographycal space		Vegetation Types.		
									Urban	Suburban	Rural	Nat-ural	Anthro-pogenic	For-est	Mar-sh	La-ke	Indus trial	Agricul tural	low Land	Middle Land	High Land
Maradana									✓				✓		✓		✓		✓		
Gampaha									✓				✓		✓		✓		✓		
Ambepussa									✓				✓	✓		✓		✓	✓		
Rambukkana										✓			✓	✓		✓		✓	✓		
Kadigamuwa												✓		✓				✓		✓	
Ihala Kotte											✓	✓		✓				✓		✓	
Kaduganawa									✓				✓				✓			✓	
Kandy										✓			✓					✓		✓	
Nawalapitiya									✓				✓				✓			✓	
Galboda											✓		✓					✓			✓
Hatton										✓			✓				✓				✓
Ambewela											✓	✓						✓			✓
Pattipola											✓	✓						✓			✓
Idalgasinna											✓	✓		✓				✓			✓
Demodara											✓	✓		✓				✓			✓

Above spaces differ in their spatial characteristics, but for the study 6 are selected. According to the analysis in table 2, the selected places are Maradana, Rambukkana, Ihala kotte, Kandy, Pattipola, and Demodara.

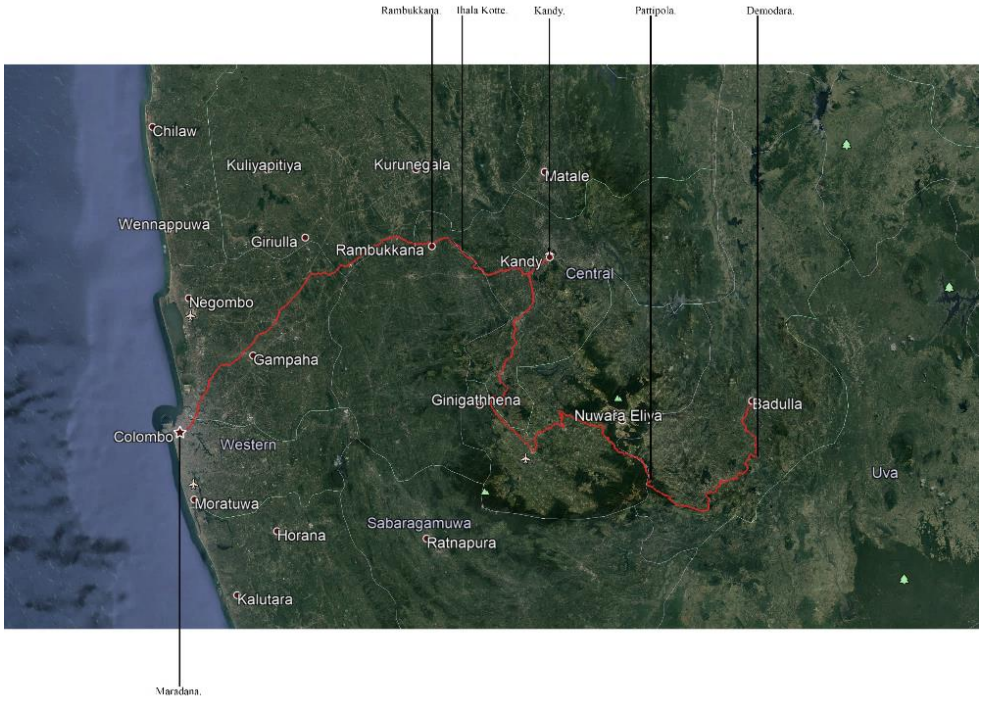

Figure 3: The train route and the selected case study areas. (*Source: Google map edited by author*)

According to the Table 2, these places were selected by considering the compatibility between each space. Spatial character differs from the, Development level, Origin, Function of geographical space, Vegetation type. The landscape preference indicators such as, Coherence, Disturbance, Complexity, Mystery, Naturalness and, Imageability changes in these selected spaces. With the change of the topographical level in the journey, the atmospheric temperature, pressure and humidity levels change. All these environmental and theoretical aspects are considered for the selection of the case studies.

The visitor/traveller who is visiting Sri Lanka away from his/her usual environment, for a shorter period of time is mentioned as “tourist” according to SLRDC. The international tourist arrivals show the study statistics which is done by the shows that,83.20 % of them are for holidays, recreation, and touring out of the total number of tourists who had visited Sri Lanka in 2019. Out of these we could observe 80% of the tourists chose to stay in Hill Country (Rathnapura, Nuwara Eliya and Badulla). This is because of their attraction towards the scenic landscapes and journeys. 30 subjects were taken to do the online questionnaire, from a Facebook group which was made for the “Badulla railway travellers”. The travel journey was divided into two stages for the field data collection as,

1. Colombo to Kandy Rail side landscape photos and video collection
2. Kandy to Badulla Rail side landscape photos and video collection

The data collection was done in two methods; Quantitative data collection, and Qualitative data collection This questionnaire includes 22 questions, 20 quantitative questions and 2 qualitative questions. These questions are related with the theoretical issues and some imagination-based issues. Most of the tourists do not understand a theory in these natural behaviors and landscapes, but they perform activities related with their satisfaction towards the journey and the surrounding. Below is an explanation for the use of questionnaire for the data collection.

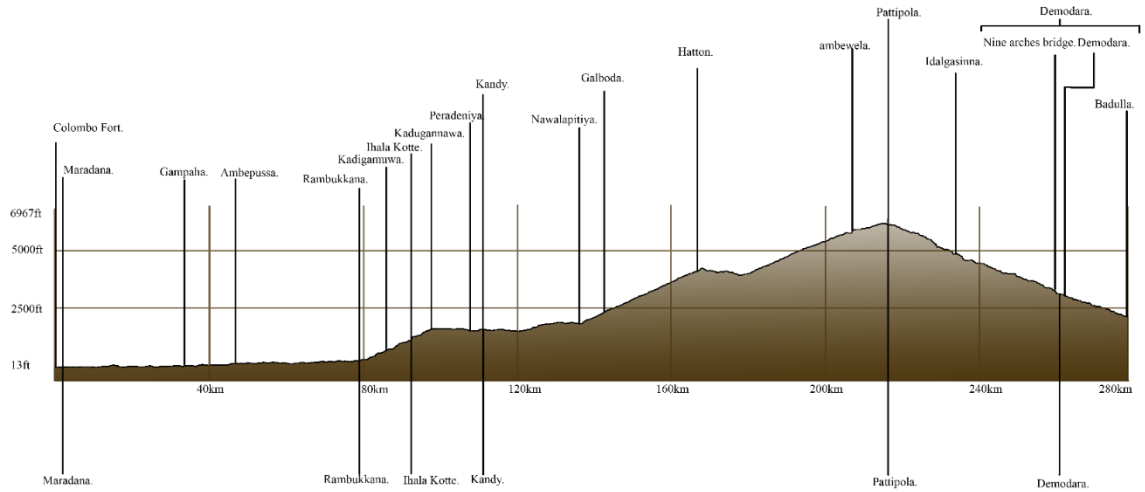

Figure 4: Cross section of the railway route from Colombo to Kandy with the selected places for the case study (Distance vs elevation) (*Source: Drawn by author*)

Table 3: Use of the questionnaire for the data collection. Source: Compiled by Author.

Concept.	Landscape characteristics.	Questions presented.
Coherence.	1. Spatial arrangement of water. 2. Spatial arrangement of structures.	Pattern repetition. Presence of water.
Disturbance.	Presence of Disturbing elements.	Pleasant visuals.
Complexicity.	Rich sensory information with spatial hierarchy.	Landform diversity
Mystery	1. decreases with perceived distance. 2. decreases with perceived screening. 3. Increases with special definition. 4. Increases with perceived physical access.	Mystery.
Naturalness.	1. Shape of vegetation. 2. Water in the landscape.	1. Natural 2. Stress releasing.
Imageability	Viewpoints	1. Uniqueness. 2. Memorable.
Visual Scale	1. View shed size. 2. Depth of view. 3. Proportion of open land	Visual presentation.

Maradana is a main railway hub situated in the Colombo district. The landscape comprises with buildings, residences, play grounds and landmarks. 'Nelum Kuluna' (Lotus Tower) a recently built landscape element acts as a landmark making the area memorable in the moving journey standing against the scale of the other landscape elements. Maradana belongs to the wet zone of Sri Lanka. The trees and bushes have the character of low land rainforests in Sri Lanka. The vegetation cover is very low when compared with the other selected places because Colombo is a main economic hub with a vast ongoing and existing developments happening in the landscape (Figure 5).

Out of the six places selected, Ihala Kotte was chosen with the highest score for the satisfaction level from Colombo to Kandy. This is because of the uniqueness of the landscape elements and the changes that happens with the topography of the character with the movement towards a higher peneplain of the country. The spatial arrangements of the elements are natural in Ihala Kotte landscape. The spatial arrangement of vegetation comes to a level where the tourist feels like, he/she is moving through a mountainous forest. The density of viewpoints in the Ihala Kotte railway landscape is high with a broad viewing distance and scale. The viewing points change every minute while climbing around the mountain (Figure 7).

Figure 5: Maradana railway landscape image collection. (*Source: Compiled by Author*)

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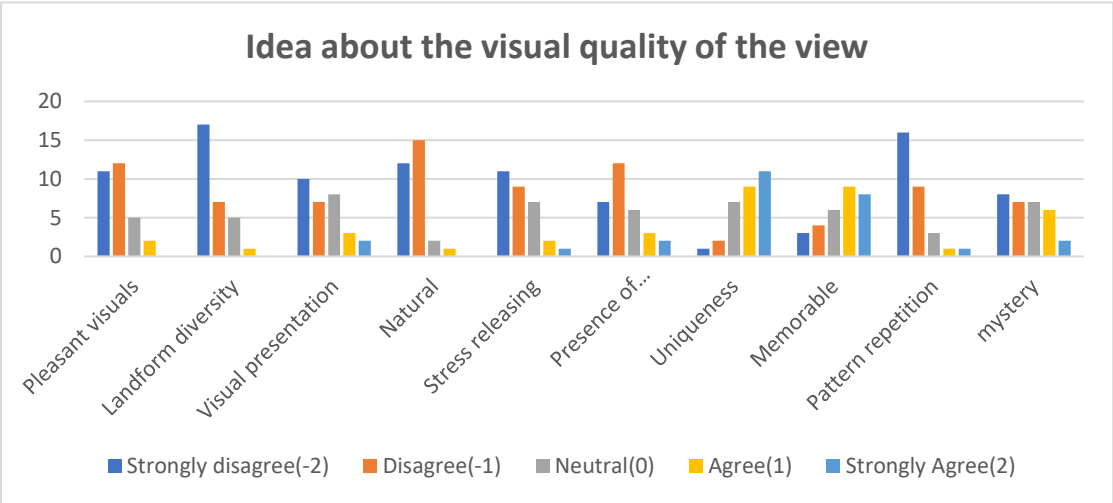
A low satisfaction level could be observed, because the spatial screening declines. 'Nelum Kuluna' (Lotus tower) acts as a landmark; making the slide viewing landscape journey memorable yet the visual scale of the area is very low with the upcoming and existing developments of the area. When looking at the table 4 presented from Proportion of open Land: Very low, View shed size: Very low, Depth of view: Very low.

Table 4: Idea about the visual quality of the view (Results from the questionnaire), (*Source: Compiled by Author.*)



Though the lowest peneplain has minimum variation in the land topography, there cannot be seen any visual disturbance unless due to urbanization. These developments have narrowed the view shed size of the moving landscape, and the depth of view.

Rambukkana Rail side landscape is a turning point of the journey from the lowest peneplain to the middle peneplain of the country. The change of landscape in topography could be observed with the movement. Still the spatial vegetation type is of lowland rainforest character. The paddy fields, rubber plantations and coconut plantations could be observed in the landscape giving the landscape a repetition of elements. These factors are immediately revealed from the visual information while giving a high coherence value to the Rambukkana Rail side landscape. The area is considered to be in a semi urban development area with a spatial arrangement of vegetation unique to the lowland semi urban landscape character. The view of the cloud effect in the evening brings different colors to the image (Figure 6).

The structures and vegetation arrangements do not affect the visual scale of the landscape. We could observe the open land more than the built area. (Figure 6) Rambukkana railway landscape consists of marsh lands, paddy fields, rivers and plantations. These landscapes are diverse with flora and fauna species which brings a complexity to the landscape. The spatial definition of the landscape is high, through which tourist satisfaction increases while giving the feeling of exploring more. The screening views get more diverse when getting closer to the highlands while the view of the landscape is broadly spreaded to the landscape. We could observe the sky in a higher ratio when compared with the land (High in Cloud effect).

Figure 6: Rambukkana Railside landscape image collection (Taken when travelling in the train) (*Source: Compiled by Author*)

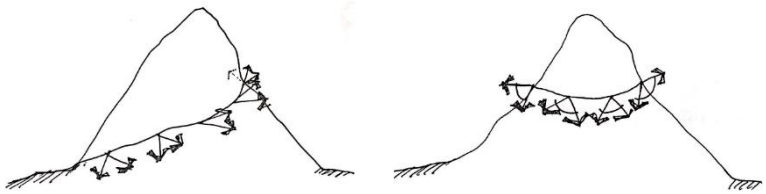


Figure 7: change of views when moving around the mountains. (*Source: Compiled by Author*)

The density of viewpoints in the Ihala Kotte railway landscape is high with a broad viewing distance and scale. The viewing points change every minute while climbing around the mountain (Figure 07).

In accordance with the slide view of the figure 6; one could observe the, change in shade, viewing depth, viewpoints (Figure 8) and Sky: land ratio changes. The cloud effect is barely visible when moving through these landscapes unless it's a deep slope with a higher visual scale (Figure 8 A –C, I - L). There are no disturbing elements which distracts the moving view unless electricity supply wires, where it is obvious for a rural mountainous landscape. The complexity of the landscape adds more value to the landscape character of the journey. The montane forests, borrowed landscapes, flora and fauna combination (See Figure 8)

The subtle integration of the hard landscape elements, fills the journey with complexity, making a drastic change in the perception of the tourist. The Journey is filled with mysteries, where the tourist feels keener on finding out what is next to come in the visual field. The questionnaire data, proves this, where a high score is given for mystery (Table 6, explained under indicators of Mystery,). The moving journeys point where a scenic change in A to B Through a tunnel is questioned from the tourist.

In accordance with the slide view on figure 10; one could observe that the, Vegetation level decreases Viewing depth decreases, Presence of disturbing elements increases, Naturalness decreases (proportion of open land, view shed size, depth of view decreases), The railway journey from Watawala to Pattipola is a scenic drive through high land mountainous landscape. Pattipola has an elevation of, 1897.5 m above mean sea level. This is the highest railway station in Sri Lanka. The drive is through mountains, tea estates and mystic atmospheres (Figure 11).

The spatial arrangement of vegetation is unique to the highlands, having tree types which cannot be seen in the middle and lower peneplain of the journey. Trees like *Calophylum walker, Cinnamomum ovalifolium, Michelia nilagrica* (Wana sapu) has their unique structure. These trees show the character of Sub Montane Forests and Moist monsoon forests. The visual scale (ratio) of the view can be in in different conditions in highland (see figure 11)

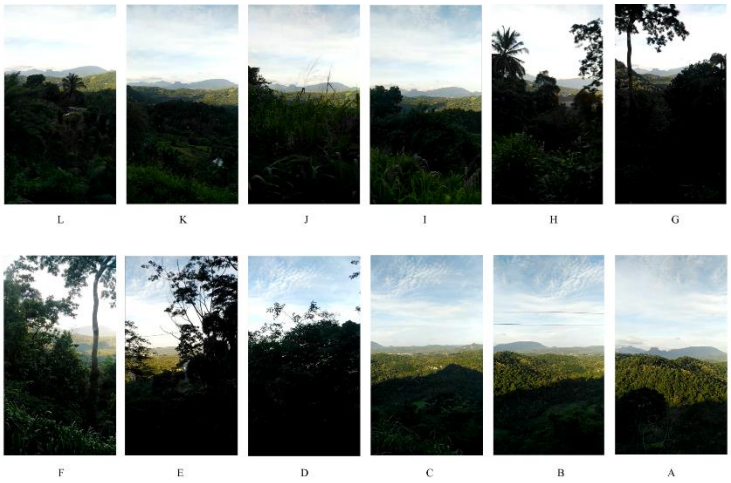


Figure 8: Ihala Kotte Railside landscape image collection (Taken when travelling in the train)
(*Source: Compiled by Author*)

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"Kandy" situated in the middle peneplain of the country does not show a vast change in the vegetation type and the spatial arrangement when compared with Ihala Kotte. When approaching towards the city landscape of Kandy, the tourist could see the development that happened and the change of rail side landscape character. A feeling of moving in a high level of land arises because of the low visual scale of the area. (Figure 10)

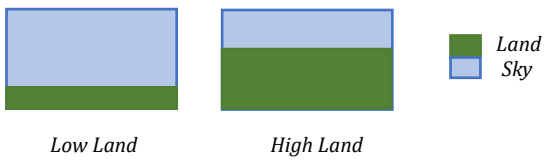

Figure 9: Visual ratio between sky and land in lowland vs highland. (*Source: Compiled by Author*)

The visual scale and the depth decrease in the landscape when compared with a lowland Rail side view. Vegetation is denser around these landscapes, yet there is a growing development happening towards the city side of the railway journey. High coherence could be observed with the clear immediately revealed information. The depth of the view is low, because of the vegetation and topography. Mystery of the journey decreases when the spatial definition decreases. Imageability is low in Kandy because of the areas lack of viewing points through the landscape.

Disturbance level is very low in these from the start of Watawala, where we could observe shanty like structures at the end near to Pattipola. There was a high score for picking the answer "strongly agree", for stress releasing, when considering this area where we could see high score for the naturalness in the journey. This proves the ability to arouse feelings in tourists which means the landscape has a high complexity. The mystery in the visual field comes

with foggy weather (figure 11 image A-N) where the visual field of the tourists is obstructed while bringing curiosity as to what is next to come and a mystic feeling.

Figure 10: Kandy Railside landscape slide view (Taken when travelling in the train)
(*Source: Compiled by Author*)

Figure 11: Pattipola Railside landscape slide view (A-N) (Taken when travelling in the train)
(*Source: Compiled by Author*)

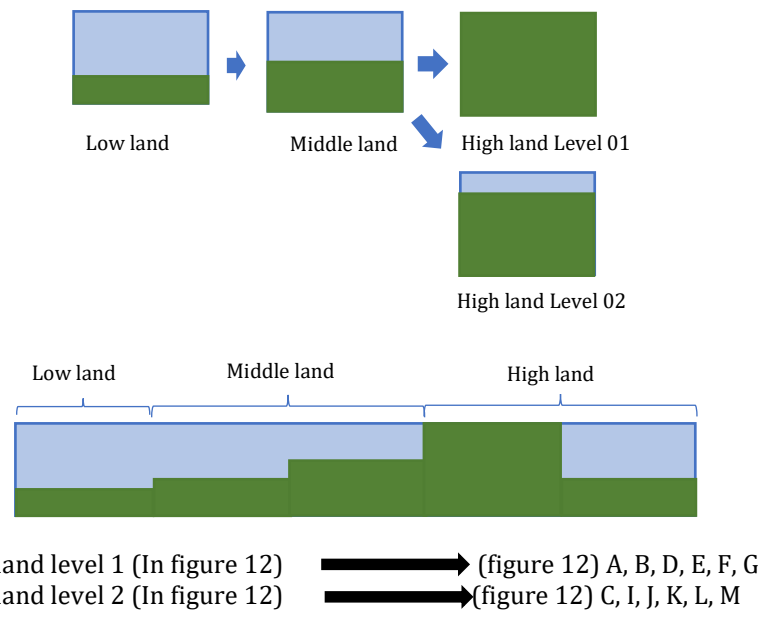

Figure 12: Visual ratio of cloud effect (Sky: Land) in Lowland Vs Highland and Cloud effect variation in relation to the land towards highlands. (*Source: Compiled by Author*)

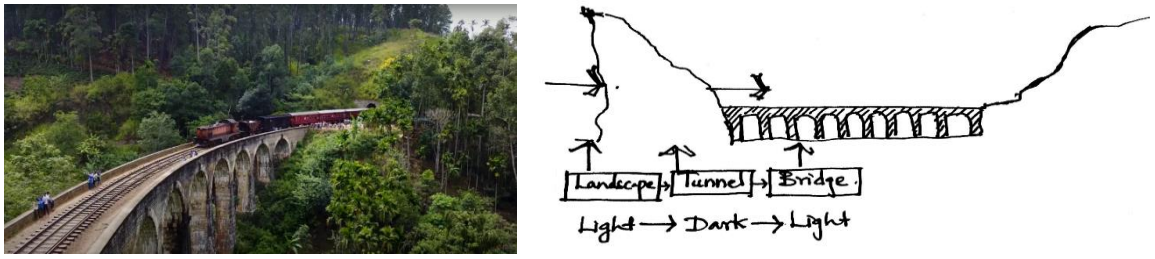

Figure 13: A train entering the bridge through the tunnel to the nine arches bridge. (Drone image) Source: (Compiled by Author **Location URL -** http://shorturl.at/dEMRX)

4. Discussion

Coherence of the landscape increases through the journey when moving through different levels of vegetation types. The special arrangement of structures gets differentiated when moving upland from highly urbanized areas to rural landscapes. The lack of contextual fit to the landscape could be observed around Maradana, Rambukkana and Kandy railway landscapes, mainly because of their urbanization with the presence of disturbing elements which distracts the visual field of the tourist. This could be observed with the low agreeing percentages towards Maradana and Kandy railway landscapes giving the lowest percentages in comparison to others, as 7%, and 63% respectively.

Table 5: data summarised from questionnaire in percentages. Source: (*Source: Compiled by Author*)

landscape indicators.	Coherance		Disturbance.	Complexity.	Mystery.	Naturalness.		Imageability		Visual Scale.
Questions Presented.	Pattern Repetition.	Presence of water.	Pleasant Visuals.	Landform Diversity.	Mystery	Natural.	Stress releasing	Uniquness.	Memorable	Visual representation.
Maradana	7%	17%	7%	3%	27%	3%	10%	67%	57%	17%
Rambukkana.	67%	70%	70%	43%	47%	57%	57%	20%	13%	50%
Ihala Kotte.	43%	70%	63%	63%	90%	80%	80%	50%	43%	80%
Kandy.	30%	30%	43%	43%	30%	13%	13%	30%	23%	40%
Pattipola.	73%	60%	90%	90%	87%	77%	77%	80%	80%	67%
Demodara	50%	70%	60%	60%	57%	57%	57%	83%	90%	57%

The Complexicity is preferred as the tendency to prefer rich sensory information in the moving landscape journey. The Complexicity of the Maradana railway landscape is low (3%) when com-pared with the Complexicity in Pattipola railway landscape area (90%) as the individuals tends to prefer diversity of the landscape with rich sensory information. The sight, touch and sound all gets connected here for the outcome of sensory information towards the tourists' satisfaction.

The highest agreeing level in Mystery, is given as Ihala Kotte (90%), making Pattipola and Demodara respectively. The morphology in the landscape within Rambukkana to Ihala Kotte brings the tourist to a mysterious landscape experience which happens with the increasing of perceived screening, spacial definition, and physical access. Even though the tourist cannot move outside the train to experience the landscape, the train itself carries them through the mountainous tunnels, taking them to sense of mystery. The perceived levels of Naturalness increase towards Pattipola giving an agreed percentage of 77% for stress releasing and natural views.

The Imageability in Demodara railway landscape is showing the highest agreeing percentage with 90% of the tourists selecting the area as a memorable experience and 83% preferring to its uniqueness. This is because the presence of nine arches bridge and the Demodara loop giving a high number of viewpoints. The visual representation of the railway landscape is highest in Ihala Kotte with a considerable visual scale towards the mountain ranges and valley landscapes. Even though this is present in the Demodara and Pattipola areas, the travel is through foggy climates which covers the; landscapes, blocking the view. The lowest score to the visual scale is to the Maradana Railside landscape area (17%) which blocks the visual field with artificial structures and buildings in the landscape. From the Questionnaire survey there was a mismatch in the answers when the tourist was given place names in the railway journey to pick the most preferred place and to select the most preferred place from photographs. This proves that the tourists get attached with the landscape character, not with the place name.

5. Conclusion

The research aim was to identify the relationship between the visual characteristics of the rail side landscape for tourist satisfaction, based on a quantitative and a qualitative analysis using photographs, on satisfaction levels of the

tourist. It can be concluded that the visual characteristics in the rail side landscape and its developments effects on the aesthetic satisfaction. The results indicate that the tourists body senses the landscape with sight, sound and touch. The results of this study indicate the moving landscape characteristics involves in tourists' satisfaction through moving landscape indicators which are as, Coherence, Disturbance, Complexicity, Visual scale, Naturalness, Imageability and mystery. Tourists get attached with the place not with its name but with its character. Sri Lanka which has undergone a civil war for 26 years from 1983 to 2009 is now in a good position in tourism when comes to the end of civil war. Sri Lanka is building up its place in tourism while standing up in its unique character, making attractive destination places for the worldwide tourists. Its attractiveness has brought Sri Lanka on scoring the highest number of tourist arrivals in 2018.Unfortunately by 2019 the worldwide pandemic (Covid – 19) has affected Sri Lankan tourism according to the Statistical report of Sri Lanka Tourism Development Authority. Yet The countries cultural, natural identity stands still unchanged.

The approach was taken to identify the moving landscape experience with reference to the scenic railway journey from Colombo to Badulla. This experience covers Sri Lanka's three geo morphological zones in a few hours of the day. The moving railway visuals acts as a slide viewing landscape throughout the travel, by bringing out different cultures, landforms, temperatures and moving landscape characteristics which effects in tourists' satisfaction. The study mainly focuses on landscape aesthetic theory and its application on finding the landscape characteristics which effects in the satisfaction in moving journey. Identification of related theories which effects in visual satisfaction, and applying them into moving landscape was a challenge, yet the speed of the Sri Lankan railway allows the passenger to clearly observe the passing landscapes making a positive factor for the research analysis. Also, this research will be an added advantage to understand the tourist perception toward the landscape which will be helpful in future Railway related landscape and infrastructure developments.

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