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Assessing Landscape Perceptions of Urban Waterscapes

Cigdem Sakici

Kastamonu University, Faculty of Engineering and Architecture, Department of Landscape Architecture, 37150 Merkez, Kastamonu, Turkey

KEYWORDS Edirne. Visual Landscape. Water Element. Water Feature. Waterscape

ABSTRACT Water is one of the most significant design elements that contributes to people feeling good physically, behaviorally and psychologically. This paper aims to reveal the landscape values of various water compositions. As a result of the assessment of 20 different water compositions using a questionnaire and landscape assessment approach in different places in Edirne, the effects of water on landscape perceptions and preferences were revealed. With the help of the questionnaire answered by 100 people, visual preferences of the users, feelings and assessment of waters with the predetermined adjective pairs and landscape values were revealed for different water features. Variation analysis, correlation analysis and factor analysis were used in the study. It was found that waters with different features created different effects and they got higher values in terms of visual-spatial effects and functionality criteria when assessed in terms of landscape values. It was also revealed that natural and almost natural water scenes, wide water surfaces and silent or almost silent water scenes created a feeling of tranquility.

INTRODUCTION

Open green areas in cities are of great importance for both, urban and human health. Every spatial factor and component that make green areas are significant, and the significance of these factors has been revealed by many researchers in terms of increasing the visual quality of the area in a visual quality assessment. Arriaza et al. (2004) put forward in their study about visual quality assessment of rural areas, that the level of nature and positive human-made factors influenced preferences positively and the presence of water, vegetation rate and color contrasts were important with regard to preferences (Ren and Kang 2015).

Water is the most significant component of open spaces. Water is a unique material for landscaping (Burmill et al. 1999). It is a dominant feature in many environments (Pitt 1989; Svobodova et al. 2015). The aesthetics of water are eye-catching and intriguing. It is an important component of landscape designs for being shapeable, its movements and reflection.

Water is the most important, necessary and valuable source and is the reason the presence of living organisms (Lin 2015). Water, which was used for drinking, cooling off, and cleaning in the beginning, started to be carried to land by filling it in leather and clay pots or bamboos (Simonds 1983). People have used water for drinking, irrigation, transportation and recreation (Booth 1983). Water presents its aesthetic beauty to human beings generously (Campbell 1978; Ulrich 1983). For this reason, it is used in designs frequently. Besides its aesthetic attraction, water has numerous positive effects on spaces (Svobodova et al. 2015). It provides coolness, hosts wildlife and conceals noise pollution (moving water absorbs irritating sounds), relaxes, provides visual richness and mediation and symbolic, figurative and reflective features and thus, creates a sense of wideness, light, brightness and mystery. It might draw the attention of people, creates a visual and auditory landmark, and lessens mental fatigue and so on. This element of water, which creates these effects, is used by landscape designers in parks and gardens frequently (Nasar and Lin 2003). Landscape theories and researches assert that people like waters (Ren and Kang 2015; McCulley 1976; Ulrich 1983). However, what kinds of effects different waters have on people are not known. The predictions of scientists who theorized in terms of the reactions of human beings (Whyte 1980; Booth 1983; Treib 1987; Dillon 1991; Hannebaum 1998) often differ. While Booth (1983) asserted that moving waters awakened people, Hannebaum (1998) asserted that these waters were a source of relaxation. Sorvig (1991) reported that water caused resplendent and soothing and gloomy opinions. Yet, researchers agree that still waters have a soothing effect. Booth (1983) stat-

Address for correspondence:
Dr. Cigdem Sakici
Telephone: +90 0366 280 2926
Fax: +90 0366 215 2316
E-mail: csakici@kastamonu.edu.tr

ed that still water created a sense of tranquility and calmness, and Hannebaum (1998) stated that these waters created a sense of serenity.

Within the scope of this paper, it was aimed to reveal the landscape values (visual-spatial effects and functionality remarkable, visual quality, differences, visual appeal, interesting, originality, emphasis-focus, visual symbolize, harmonizing with urban, local scene, relaxing/comforting, router, continuity, linkage-separating and natural vision), arrangement (maintenance and redesign), usage and degradation (surrounding usage and degradation) and ecological value (wildlife and plant diversity)) of different water compositions, which were still and cascade and mobilized via slopes, fountain and jet by making use of Acar and Sakici's study (2008). Also, these different waters were assessed by the users with the help of adjective pairs (Sakici and Var 2014) and the feelings on the users were revealed. Lastly, which of the different waters were preferred and which of them were not revealed and which of them were rearranged were revealed with the reasons.

MATERIAL AND METHODS

Field of Study and the Determination of Waters to be Included in the Study

In the study, water arrangements in the Edirne city center and the surrounding area were examined. Firstly, in order to determine the waters, different water usages in Edirne (35 different water areas) were videotaped and pictures were taken. Then an expert group consisting of 8 landscape architects assessed the scenes, and the subjects assessed 20 scenes (Sakici 2014). The distribution of waters included in the study is shown in Figure 1.

In order to reveal the features of the waters, a measurement scale was prepared by benefiting from the studies of Arriaza et al. (2004), Ergin et al. (2004), Nasar and Lin (2003), Acar et al. (2006), Acar and Sakici (2008) and Sakici (2014) (Table 1), and variables were determined on the basis of mean scores according to this measurement scale

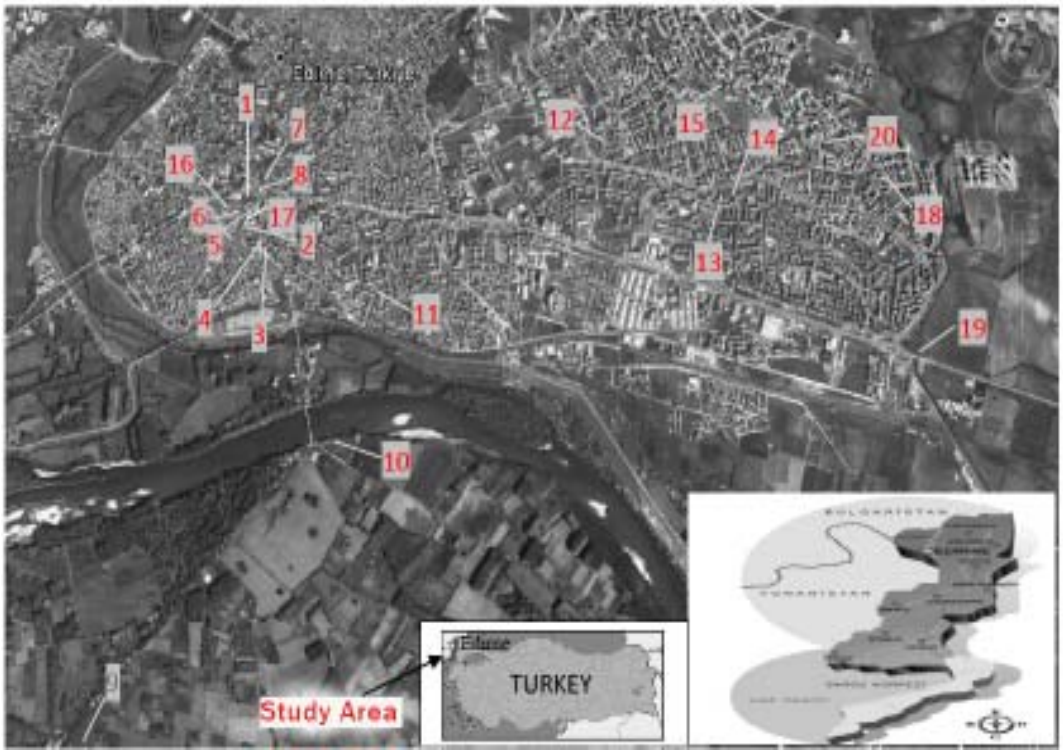


Fig. 1. Study area (adapted from 20 samples of waterscapes)

Table 1: Measurement scale of waterscapes attributes and elements

Type and subtype characteristics of waterscapes	*Abbreviation*	*Scoring*				
		1	*2*	*3*	*4*	*5*
A. Characteristics of Area						
1. Degree of wilderness	WILD	natural	natural-looking	Artificial		
2. Type of topography	TOPO	Almost flat	slightly wavy	some mountains		
3. Type of vegetation	VEGE	no vegetation	herbaceous	herbaceous and bushes	bushes and trees	mix (her.+ bush.+tree)
4. Percentage of land covered by vegetation	PVEG	None	0-30%	30-60%	60-100%	
B. Characteristic of the Water						
5. Water movement	MOVE	no moving	little moving	middle moving	much moving	
6. Flow direction of water (horizontal-vertical)	FLOW	none	Downward (Flowing)	Downward (falling)	upward (jet, fountain..)	Downward + Upward (mix)
7. Water flow	WFLO	none	regular	irregular		
8. Flow rate of water	FLOR	still	slow	medium	fast	
9. Shape of the fall of water	SHFA	none	free-fall	obstructed fall	sloped fall	free+sloped fall
10. Shape of water	SHAP	geometric,	formal	organic, informal		
11. Amount of water scale	SCAL	small	medium	large		
12. Amount of water deepness	DEEP	none	shallow	medium	deep	
13. Clour of water	CLOU	light	medium	dark		
14. Noise of water	NOIS	quiet	low voice	middle voice	too voice	
15. Appearance of water	APPE	enclose	Semi-open	open		
C. Usage of the Water						
16. The composition of water	COMP	only water	with arch. element (sculpture)	Sculpture+ plant	with rocky	Sculpture + plant + rocky (mix)
17. Use of architectural element	ARCE	None	little	middle	much	
18. Use of rocky	ROCK	None	little	middle	much	
19. The purpose of water usage	PURP	Visual, symbolize	border and separator	determination and emphasis	connective provider continuity	

by means of an expert method. The waters were assessed according to three main features, which are the characteristics of the area (naturalness, topography, vegetation and the covered area), the characteristics of the water (movement, flow direction, flow speed and fall, the form, magnitude, depth, color, appearance and sound of the water) and the usage of water (water composition, architectural factor and use of rock and the aim of water usage) and 19 mean features. In Table 1, the measurement scale of the landscape features of the different water areas in Edirne are shown.

Basically, water elements can be classified as still water and moving water. While still water consists of flat, static, silent and motionless, moving water is flowing, falling water of which movement is facilitated with the help of stairs, cascade, slope, fountain and jets (Booth 1983). In Nasar and Lin's study (2003), water movements were assessed under five sub-categories, which were still, flowing, falling, both flowing and falling, and jet waters. This assessment is rather similar to the researcher's assessment, but falling water was also examined under three separate categories. The movement of the water in the water elements used in the study was assessed in seven categories which were still-still looking (photo 10 and 15), flowing + jet (photo 7, 8 and 18), falling (photo 5 and 6), falling + jet (photo 13, 17 and 20), gradual falling + jet (photo 2, 3 and 12), jets and fountains (photo 1, 4, 11 and 19), and flowing + falling + jet (photo 9, 14 and 16) (Sakici 2014).

Description of the Survey

Since water is a source of pleasure and relaxation, which appeals to the eye and ear, it is often used in landscape work. Water-related designs have always appealed to people and drawn attention. This paper focuses on the landscape perception assessment of water compositions used in various areas. In order to enable landscape perception of water compositions, a questionnaire was used. A questionnaire is a frequently preferred method in determining the effects of natural areas and arranged places and used by various researchers (Paine and Francis 1990; Marcus and Barnes 1995; Ghose 1999; Whitehouse et al. 2001; Zimring 2002; La Fargue 2004; Sherman et al. 2005; Acar and Sakici 2008; Sakici 2014). The questionnaire consists of 5 different parts each of which have been prepared for different purposes:

Part A: To determine the demographic characteristics of the subjects.

Part B: To determine which scene or scenes were liked and not liked by the subjects and which of them were asked to be rearranged and how.

Part C: To determine the feelings created by different water compositions on the users.

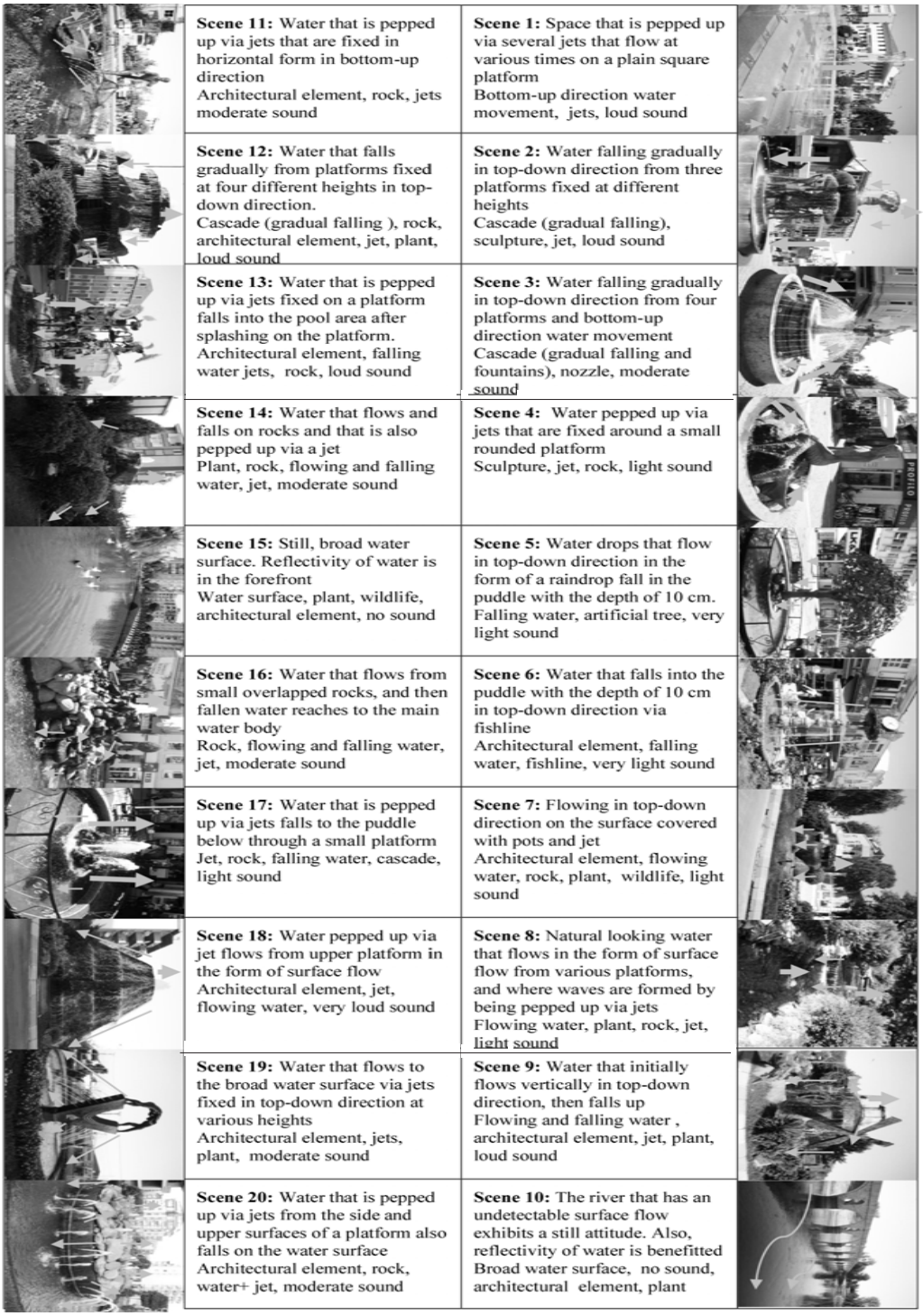
Part D: To assess the scenes by the adjective pairs.

Part E: To determine the landscape value of each scene in terms of 'Visual-spatial effects and functionality', 'Arrangement', 'Usage and degradation' and 'Ecological value'.

Since the subjects could not be taken to 20 different water elements at different points of the city, the visualization method was used. Representative validity of photographs in assessing landscape was proved in various studies (Hershberger and Cass 1974; Zube 1974; Daniel and Boster 1976; Craik 1983; Law and Zube 1983; Kellomaki and Savolainen, 1984; Stewart et al. 1984; Brown and Daniel 1987; Trent et al. 1987; Zube et al. 1987; Stamps 1990, 1993; Hull and Stewart 1992; Nasar 1998; Clay and Daniel 2000; Palmer and Hoffman 2001; Nasar and Lin 2003; Acar and Sakici 2008). However, photographs and slides do not have a dynamic setting diversity that consists of movement and sounds. Thus, there are also studies which reveal that they do not represent the setting completely. Brown and Daniel (1991) found systematic differences between static and dynamic settings. They stated that static symbols such as slide and photograph cannot reflect dynamic environmental effects such as flow sufficiently, but footages reflect the details of the flow. Similarly, Anderson et al. (1983) and Hetherington's (1991) research results revealed that sound and movement (Ren and Kang 2015) affected preference. For this reason, footages were also used in the study to determine the effects of sound and movement of water and photographs were used to remind the scenes (Sakici 2014).

Footages and photographs were taken in the summer of 2011 between 3pm and 6pm. In the 2-minute footage, it was paid attention to screen the water composition as a whole from a distance and to show the water flow from general to detail and how it hit the floor. Also, each water composition was photographed from different angles. The researcher took photographs of more than 30 water compositions and an expert group consisting of 8 people chose 20 of them, and the study was conducted accordingly. All the photographs were taken by the researcher with a Nikon Coolpix 4100 camera and all the footages were taken with a Canon MV800 video camera (Sakici 2014). The features of the water areas, flow directions and density are shown in Figure 2.

University students with the help of a questionnaire assessed the water scenes. The questionnaires were filled out in a silent area in groups of 10 to 15 people. The purpose of the study was explained to the participants before they started to fill out the questionnaires and then they were shown the scenes on an overhead projector and after each scene was seen, they were asked to fill out the related part. The questionnaire process took almost 60 minutes (watching the scenes 2 minutes x 20 scenes + filling out the questionnaires 15 to 20mins). In Part B of the questionnaire, there are three open-ended questions such as, "Which is your most favorite or worst scene?" Prior to the assessment, the participants were given a simple orientation to the water scenes. In Part C, the participants were asked to tick the feeling that they felt upon seeing the water compositions. In Parts D and E the participants were asked to assess the questions with the help of the scale. The preferences were made on a 1 to 5 point measurement scale (1: strongly dissatisfied, 2: dissatisfied to some extent, 3: neutral, 4: satisfied to some extent and 5: strongly satisfied) by each participant for all water scenes.



Scene 11: Water that is pepped up via jets that are fixed in horizontal form in bottom-up direction Architectural element, rock, jets moderate sound	**Scene 1:** Space that is pepped up via several jets that flow at various times on a plain square platform Bottom-up direction water movement, jets, loud sound
Scene 12: Water that falls gradually from platforms fixed at four different heights in top-down direction. Cascade (gradual falling), rock, architectural element, jet, plant, loud sound	**Scene 2:** Water falling gradually in top-down direction from three platforms fixed at different heights Cascade (gradual falling), sculpture, jet, loud sound
Scene 13: Water that is pepped up via jets fixed on a platform falls into the pool area after splashing on the platform. Architectural element, falling water jets, rock, loud sound	**Scene 3:** Water falling gradually in top-down direction from four platforms and bottom-up direction water movement Cascade (gradual falling and fountains), nozzle, moderate sound
Scene 14: Water that flows and falls on rocks and that is also pepped up via a jet Plant, rock, flowing and falling water, jet, moderate sound	**Scene 4:** Water pepped up via jets that are fixed around a small rounded platform Sculpture, jet, rock, light sound
Scene 15: Still, broad water surface. Reflectivity of water is in the forefront Water surface, plant, wildlife, architectural element, no sound	**Scene 5:** Water drops that flow in top-down direction in the form of a raindrop fall in the puddle with the depth of 10 cm. Falling water, artificial tree, very light sound
Scene 16: Water that flows from small overlapped rocks, and then fallen water reaches to the main water body Rock, flowing and falling water, jet, moderate sound	**Scene 6:** Water that falls into the puddle with the depth of 10 cm in top-down direction via fishline Architectural element, falling water, fishline, very light sound
Scene 17: Water that is pepped up via jets falls to the puddle below through a small platform Jet, rock, falling water, cascade, light sound	**Scene 7:** Flowing in top-down direction on the surface covered with pots and jet Architectural element, flowing water, rock, plant, wildlife, light sound
Scene 18: Water pepped up via jet flows from upper platform in the form of surface flow Architectural element, jet, flowing water, very loud sound	**Scene 8:** Natural looking water that flows in the form of surface flow from various platforms, and where waves are formed by being pepped up via jets Flowing water, plant, rock, jet, light sound
Scene 19: Water that flows to the broad water surface via jets fixed in top-down direction at various heights Architectural element, jets, plant, moderate sound	**Scene 9:** Water that initially flows vertically in top-down direction, then falls up Flowing and falling water , architectural element, jet, plant, loud sound
Scene 20: Water that is pepped up via jets from the side and upper surfaces of a platform also falls on the water surface Architectural element, rock, water+ jet, moderate sound	**Scene 10:** The river that has an undetectable surface flow exhibits a still attitude. Also, reflectivity of water is benefitted Broad water surface, no sound, architectural element, plant

Fig. 2. Twenty test scenes selected for surveying

RESULTS AND DISCUSSION

Demographic Profile

Ninety students from landscape architecture and forest engineering departments participated in the questionnaire process. The ages of the participants were between 8 and 22 years. When the age distribution of the participants was analyzed in a detailed way, it was seen that 21 of the participants (23.3%) were in the 15 to 20 age group and 65 of them (72.2%) were in the 20 to 25 age group. Also, two of the participants (2.2%) were in the age group of 25 to 30, and two of them (2.2%) of them were in the age group of 30 to 35. 44.4 percent of the participants (40 people) were females and 55.6 percent (50 people) were males.

Characteristics of the Urban Water Space

Water spaces in Edirne city were evaluated according to the measurement scale explained in the previous section with an expertness approach. Figure 3 indicates the characteristics of water spaces in Edirne city. All pictures in Figure 3 differ in terms of the attributes in pictures. Scenes are statistically different in terms of percentage of land covered by vegetation ($F = 3.904$; $p = 0.029$), and the composition of water ($F = 8.555$; $p = 0.001$) according to analysis of variance.

Table 2 indicates the correlation results between three main and 19 sub-variables. According to these results, there are positive correlations between water movement (MOVE) and flow rate of water (FLOR) ($r = 1.00$), type of vegetation (VEGE) and percentage of land covered by vegetation (PVEG) ($r = 0.93$), water movement (MOVE) and noise of water (NOIS) ($r = 0.88$) and flow rate of water (FLOR) and noise of water (NOIS) ($r = 0.88$) at a 0.01 significant level. Furthermore, there are negative correlations between the shape of water (SHAP) and appearance of water (APPE) ($r = -0.92$), percentage of land covered by vegetation (PVEG) and appearance of water (APPE) ($r = -0.82$), type of topography (TOPO) and appearance of water (APPE) ($r = -0.76$) at a 0.01 significant level. The other relationships are shown in Table 2

Landscape Perception and Preferences

The answers of participants to all questions were evaluated as qualitative and quantitative, and explained with proper statistical analysis

Table 2: Correlation analysis of the landscape attributes of the water space

	WILD	*TOPO*	*VEGE*	*PVEG*	*MOVE*	*FLOW*	*WFLO*	*FLOR*	*SHFA*	*SHAP*	*SCAL*	*DEEP*	*CLOU*	*NOIS*	*APPE*	*COMPARCE*	*ROCK*
TOPO[a]	**-0.5***																
VEGE	-0.4	**0.8****															
PVEG	**-0.4***	**0.8****	**0.9****														
MOVE	0.4	0.1	-0.1	-0.1													
FLOW	0.4	0.2	0.0	0.1	**0.5***												
WFLO	-0.1	0.1	0.0	0.1	0.2	**0.5***											
FLOR	0.4	0.1	-0.1	-0.1	**1.0****	**0.5***	0.2										
SHFA	0.1	**0.5***	**0.5***	**0.5***	**0.5***	**0.7****	0.3	**0.5***									
SHAP	**-0.7****	**0.7****	**0.7****	**0.7****	-0.3	-0.1	0.1	-0.3	0.2								
SCAL	**-0.5***	**0.7****	**0.7****	**0.7****	0.1	-0.3	-0.1	0.1	0.2	**0.6****							
DEEP	-0.3	0.4	**0.5***	**0.4***	-0.1	-0.4	-0.3	-0.1	0.0	0.4	**0.7****						
CLOU	-0.4	**0.7****	**0.7****	**0.7****	-0.2	0.2	0.0	-0.2	**0.5***	**0.7****	0.4	0.4					
NOIS	**0.5***	-0.1	-0.3	-0.2	**0.9****	**0.5***	0.2	**0.8****	0.4	**-0.5****	-0.1	-0.1	-0.2				
APPE	**0.7****	**-0.8****	**-0.7****	**-0.8****	0.2	-0.1	-0.2	0.2	-0.4	**-0.9****	**-0.6****	-0.2	**-0.7****	0.4			
COMP	-0.1	**0.7****	**0.7****	**0.7****	0.0	0.3	0.1	0.0	**0.5***	0.4	**0.4***	**0.5***	**0.7****	0.0	**-0.4***		
ARCE	0.3	-0.2	-0.2	-0.1	0.1	-0.2	-0.1	0.1	-0.2	-0.3	-0.1	0.3	0.0	0.2	0.4	0.0	
ROCK	-0.1	**0.6****	**0.5***	**0.5***	0.3	**0.5***	0.3	0.3	**0.7****	0.3	0.2	0.1	**0.5***	0.2	-0.4	**0.7****	-0.4
PURP	-0.3	0.4	0.4	0.3	-0.4	0.0	0.0	-0.4	0.1	**0.5***	0.2	0.1	0.4	**-0.5***	**-0.6****	0.3	**-0.4***	0.3

The significant correlations (**p<0.01 and *p<0.05 level) are showing bold letters. The non-significant correlations (p>0.05 level) are showing as normal letters.
[a] Abbreviations of the landscape attributes were given as Table 1.

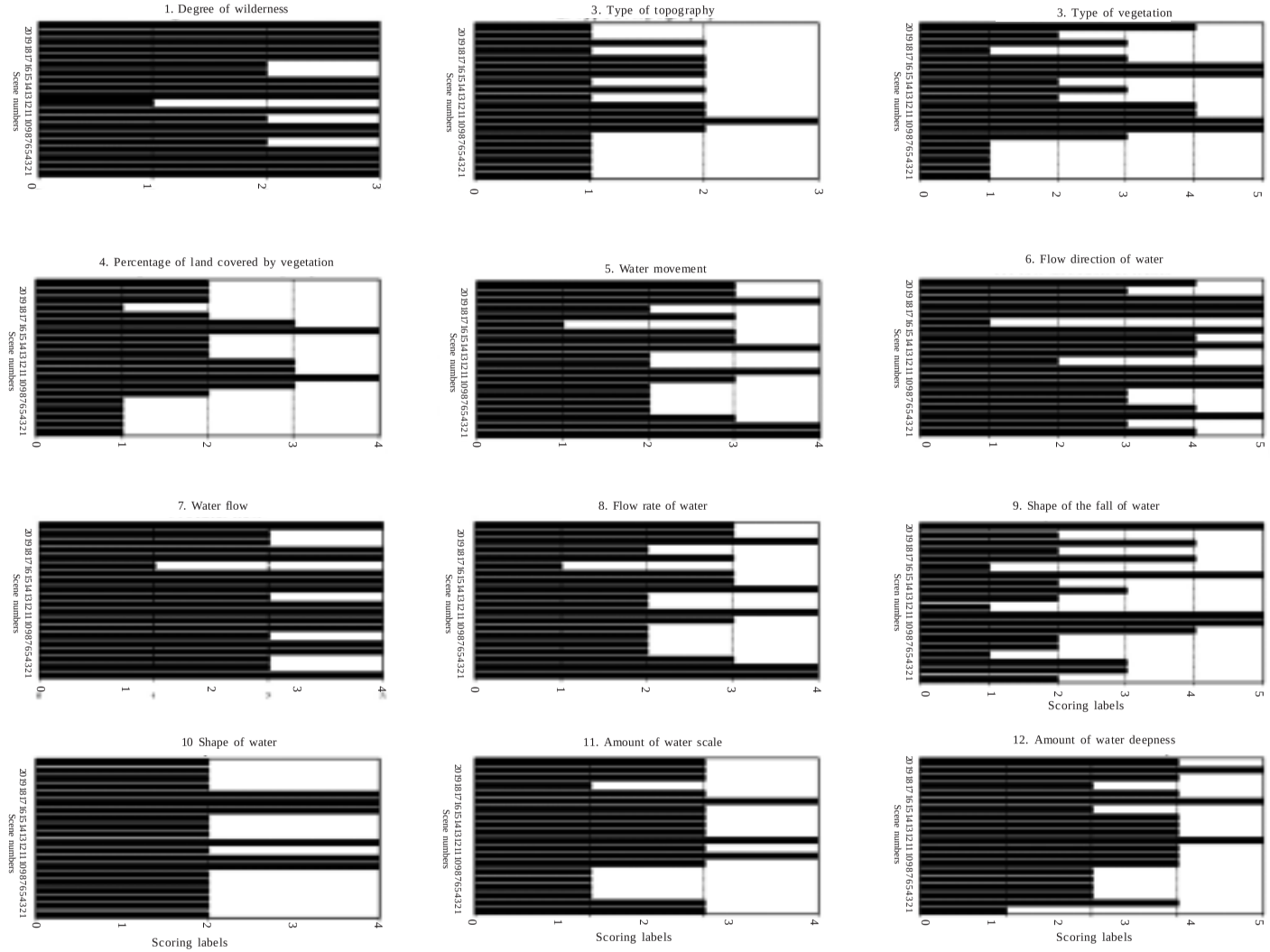


Fig. 3. The characteristics of waterspace in Edirne for the meanings for scoring labels see Table

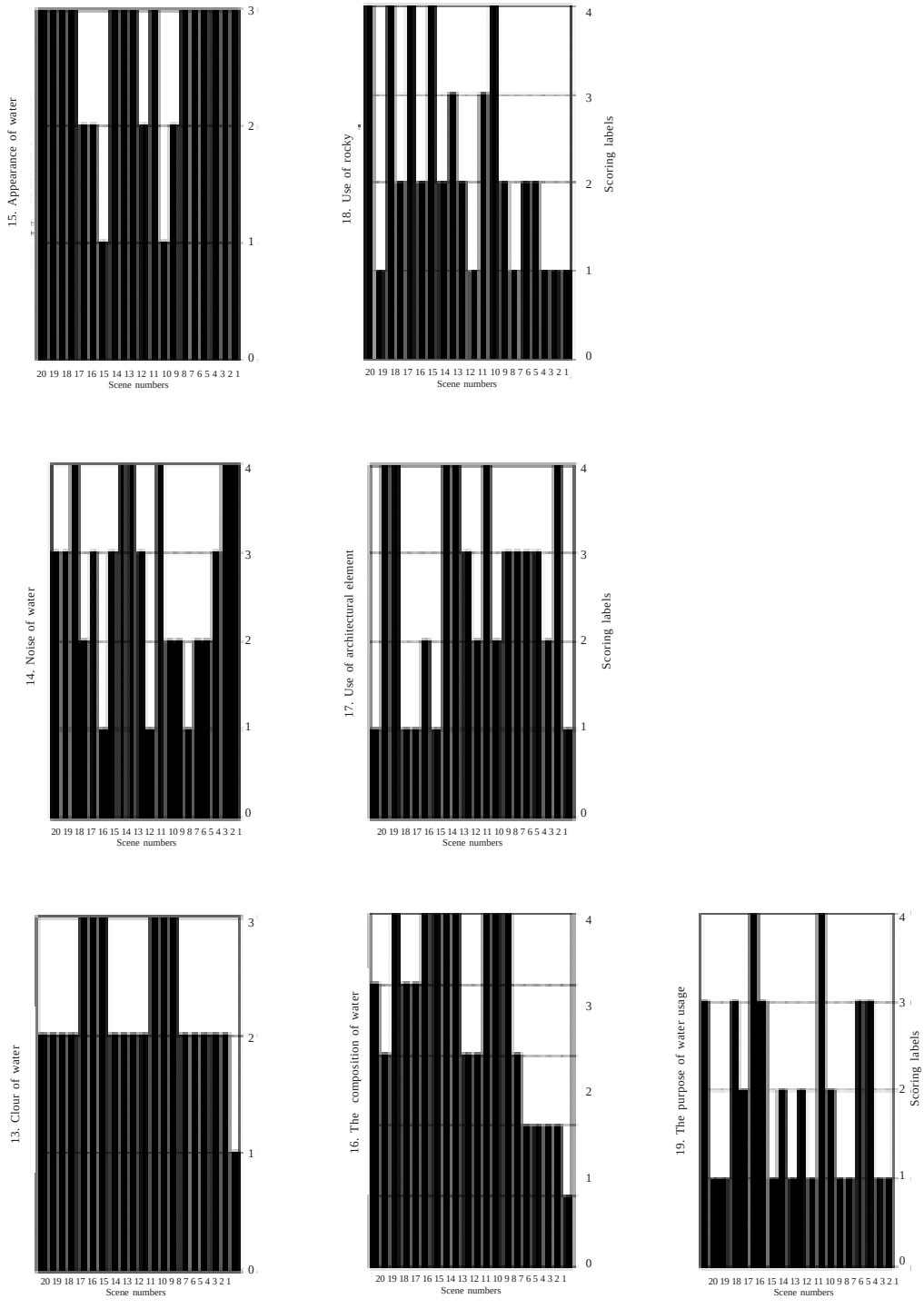

15. Appearance of water
18. Use of rocky
14. Noise of water
17. Use of architectural element
13. Clour of water
16. The composition of water
19. The purpose of water usage
Scoring labels
Scene numbers
20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
0 1 2 3 4

Fig. 3. Contd...

methods. The results were separated for three main sections in a systematic order.

Preferences for Urban Waterscapes in Edirne City

In the second part of the questionnaire, the opinions of participants on 20 scenes taken from Edirne city were investigated. Scene 5 is the most preferred picture (50%) as seen in Figure 4. Following it is Scene 10 and Scene 13, the former has a 47.8 percentage rate and the latter is at 42.2 percent. On the other hand, Scenes 16, 17 and 7 are the most preferred pictures to dislike; their rates are 43.3 percent, 37.8 percent and 25.6 percent, respectively. Finally, the question, "Which one or ones of these areas should be rearranged?" was asked, and the participants suggested that the areas in Scenes 16, 17 and 20 have to be rearranged. The rates of answers for this question relating to these pictures are 38.9 percent, 23.3 percent and 21.1 percent (Fig. 5). It can be seen in Figure 4 that the rate of the participants asking for the rearrangement of water scenes was not very high.

The participants were asked which of the 20 different water scenes they would like to change (Table 5). '*Constructiveness and Planting*' was selected by participants for the most preferred scenes in 26.7 percent (Scene 16), 18.9 percent (Scene 17) and 16.7 percent (Scene 20). The participants displayed their suggestions about shape-flow, constructiveness, planting, constructiveness and planting, and other usages for the other pictures. Participants' answers can be seen in Figure 5.

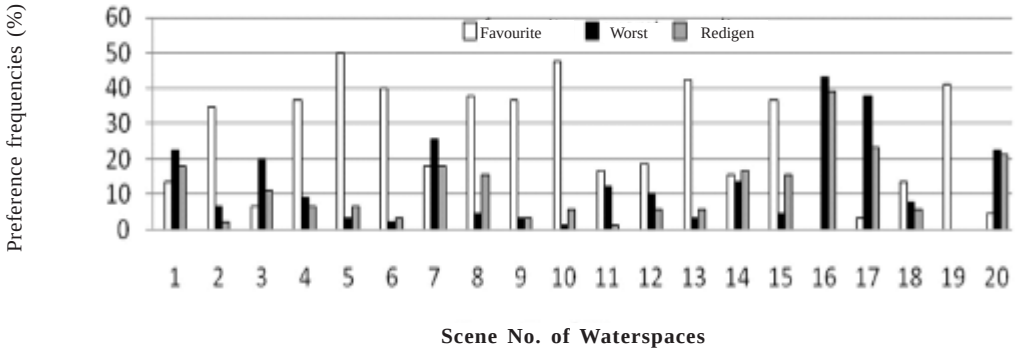


Fig. 4. Preferences of the waterspaces

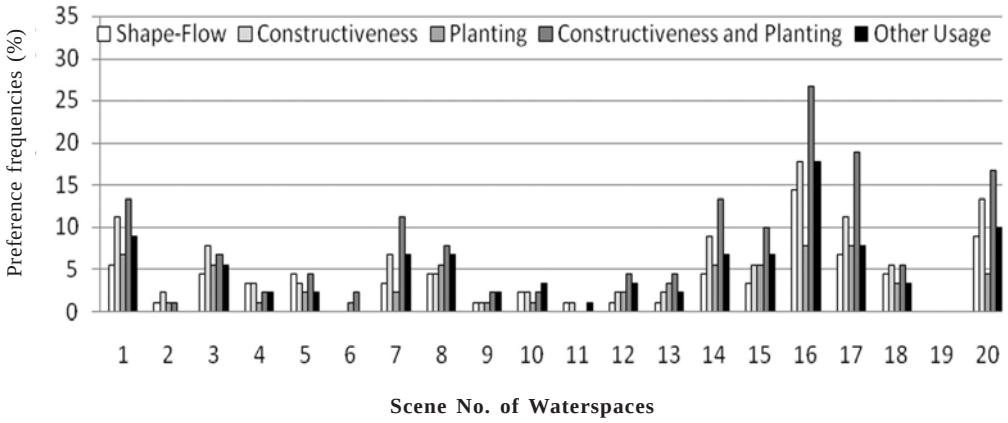


Fig. 5. Preferences based on considering proposals

Visual Perception of Waterscapes

In order for the designed places to be inhabitable, human needs should be satisfied. While the designers are designing places, they should not ignore the human beings' psychological and physiological needs. Places that do not serve to users' wants and preferences are dead places. In order to create living places, human needs need to be satisfied, which is the most significant point to be taken care of. For this reason, how people are affected by a particular place and its components psychologically should be set forth. In plans to create living designs, psychological effects of the place's components and people's spatial preferences should not be ignored.

In the third part of the questionnaire, the participants were asked to tick the feeling that they had when they looked at water scenes in order to determine the effects of water scenes on users. Then the first three water scenes preferred for each feeling were picked (Table 3). When the most preferred water scenes were examined, it was found that Scene 5 was different at a percentage of 75.6, attractive at a percentage of 73.3, restful at a percentage of 51.1, elegant at a percentage of 46.7, satisfying at a percentage of 42.2, mysterious at a percentage of 41.2 and serene at a percentage of 36.7. Water Scene 10 was found to be tranquil at a percentage of 68.9, serene at a percentage of 43.3, pure at a percentage of 42.2, and satisfying and elegant at a percentage of forty. In water Scene 1, noise (42.2%), in water Scene 4 elegance (48.9%), in water Scene 5 difference (75.6%), attractiveness (73.3%) and satisfaction (42.2%) were the feelings that the participants felt most. In water Scene 8 energetic and refreshing (37.8%) and pureness and freshness (44.4%) were felt most, whereas in water Scene 9 being focal and excitement (34.4%), and in water Scene 10 consistency (25.6%), tranquility (68.9%) and serenity-calmness (43.3%) were the feelings participants felt most. In water Scene 12 peevishness (20%), in water Scene 14 mystery (73.3%), and in water Scene 16 complexity (41.1%) and shiver (18. 9%) were the feelings the participants felt most. In water Scene 17 familiarity (37.8%) and in water Scene 19 power-might (51.1%), excitement (34.4%) and freedom (34.4%) were the feelings that participants felt most and this information is shown in Table 3.

In order to determine whether there was a relationship between the features of waters and creating a feeling of tranquility in people, the variance analysis test was conducted. According to the results of the test, meaningful differences were found among some groups (p=0.000). When waters were assessed by a degree of wilderness (WILD), it was found that natural water scenes created the most tranquility followed by

Table 3: Feelings created by water on people

Feelings	*Most preferred water scenes*		
	1. Preference	*2. Preference*	*3.Preference*
COMPLICATION	16 (41.1%; n=37)	12, 14 (31.1%; n=28)	1 (28.9% ; n=26)
CONSISTENCY	10 (25.6% ; n=23)	15 (24.4% ; n=22)	3 (23.3% ; n=21)
MYSTERY	14 (73.3%; n=66)	4, 5 (41.1%; n=37)	9 (38.9% ; n=35)
BEING FOCAL	9 (37.8% ; n=34)	10 (34.4% ; n=31)	19 (28.9% ; n=26)
DIFFERENCE	5 (75.6% ; n=68)	9 (70% ; n=63)	13 (65.9% ; n=60)
FAMILIARITY	17 (37.8% ; n=34)	8 (36.7% ; n=33)	15 (30% ; n=27)
ATTRACTIVENESS	5 (73.3%; n=66)	9 (70% ; n=63)	13 (65.6%; n=59)
ENERGETIC-REFRESHING	8 (37.8%; n=34)	9, 19 (34.4% ; n=31)	13 (33.3% ; n=30)
POWER-MIGHT	19 (51.1%; n=46)	12 (42.2% ; n=38)	18 (38.9% ; n=35)
EXCITEMENT	9, 19 (34.4% ; n=31)	5 (28.9% ; n=26)	8,18 (26.7% ; n=24)
TRANQUILITY	10 (68.9% ; n=62)	15 (55.6% ; n=50)	5,8 (51.1%; n=46)
PURENESS-FRESHNESS	8 (44.4% ; n=40)	10 (42.2% ; n=38)	5 (40% ; n=36)
ELEGANCE	4 (48.9% ; n=44)	5, 6 (46.7% ; n=42)	10 (40% ; n=36)
FREEDOM	19 (34.4%; n=31)	10 (33.3% ; n=30)	2,15 (32.2% ; n=29)
SERENITY- CALMNESS	10 (43.3%; n=39)	5 (36.7%; n=33)	6 (35.6% ; n=32)
SATISFACTION	5 (42.2% ; n=38)	8,10 (40% ; n=36)	6,9 (37.8% ; n=34)
PEEVISHNESS	12 (20% ; n=18)	19 (18.9% ; n=17)	18 (17.8% ; n=16)
NOISE	1 (42.2% ; n=38)	12, 18 (33.3% ; n=30)	2 (31.1%; n=28)
SHIVER	16 (18.9% ; n=17)	14 (16.7% ; n=15)	12 (13.3% ; n=12)

n: the number of person preferring water scene

natural-looking waters and artificial water scenes, respectively. When the amount of water scale (SCAL) was assessed, it was found that large water scenes created the most tranquility followed by small water scenes and medium water scenes, respectively. In terms of noise of water (NOIS), quiet water scenes created the most tranquil feeling followed by low voice water scenes, followed by middle and too much voice water scenes, respectively.

In the 4th part of the questionnaire, the participants assessed each water scene by 15 pre-determined adjective pairs. When all the data was considered, it was found that water scenes differed by adjective pair scorings. Since semantic difference value for each water scene was above 2.5, all the scenes were assessed by positive adjectives by the participants. Water Scene 5 scored highest with regard to beauty (4.3) and effectiveness (4.3), and water Scene 19 scored highest with regard to amusingness (4.0), being exciting (4.2), joyfulness (4.0), safety (3.9), attractiveness (4.0), originality (4.2), being glorious (4.1), being inviting (4.0), clarity (4.3), relaxing (4.1), clearness and cooling off (4.1). Water Scene 5 scored highest with regard to being relaxing (4.1). Semantic reaction results of the participants are shown in Table 4.

Factor Analysis

In the final evaluation stage, the data matrix including 19 perception items was conducted by a factor analysis, and four factors or components that accounted for approximately sixty-six percentage of the total data variance were extracted. Table 5 illustrates factor loadings and communalities for the items. Factor loadings range from 0.6 to 0.9 and communalities varied from 0.5 to 0.8.

Given the appearance of the factor loadings by the Principal Component Analysis, the factors were named as follows:

- Factor 1, accounting for 40.8 percentage of the total variance, was called 'Visual-spatial effects and functionality',
- Factor 2, accounting for 13.5 percentage, was called 'Arrangement',
- Factor 3, accounting for 5.9 percentage, was called 'Usage and degradation',
- Factor 4, accounting for 5.3 percentage, was called 'Ecological value'.

In this analysis, the first factor had relatively high loading than the others. Thus, it is clear

Table 4: Semantic differentiation values of water scenes

-	*Water scene no.*																				+
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*	
BAD	3.0	3.9	3.6	4.0	**4.5**	4.1	4.0	4.2	4.3	4.3	3.6	4.0	4.3	3.8	4.3	2.3	3.4	3.9	4.3	3.4	BEAUTIFUL
INEFFECTIVE	2.9	3.7	3.3	3.8	**4.3**	3.9	4.0	4.0	4.1	4.1	3.4	3.8	4.0	3.8	4.1	2.8	3.1	3.8	4.1	3.4	EFFECTIVE
BORING	2.6	3.3	3.1	3.4	3.9	3.6	3.5	4.0	4.0	3.8	3.1	3.6	3.8	3.4	4.0	2.9	3.0	3.6	**4.1**	3.2	AMUSING
SOOTHING	2.8	3.2	3.4	3.2	3.8	3.5	3.6	3.7	4.0	3.8	3.4	3.7	3.9	3.5	3.8	2.9	3.0	3.7	**4.2**	3.1	EXCITING
SORROW	2.7	3.1	3.2	3.4	3.6	3.5	3.6	3.7	3.9	3.8	3.2	3.5	3.9	3.3	3.8	2.8	2.9	3.5	**4.0**	3.1	JOY
WORRYING	2.9	2.9	3.1	3.3	3.5	3.5	3.6	3.6	3.5	3.7	3.2	3.5	3.8	3.1	3.9	2.9	3.0	3.5	**3.9**	3.2	SAFE
SIMPLE	3.0	3.4	3.3	3.5	4.0	3.7	3.7	3.7	4.0	3.8	3.2	3.6	4.0	3.5	3.7	2.7	2.8	3.8	**4.1**	3.1	ATTRACTIVE
ORDINARY	2.6	3.2	2.8	3.6	3.9	3.7	3.8	3.7	3.9	3.7	3.1	3.7	4.0	3.5	3.8	2.7	2.7	3.7	**4.2**	3.0	
MAGNIFICENT																					
DULLNESS	2.6	3.4	2.9	3.3	3.7	3.6	3.5	3.6	3.8	3.7	3.1	3.8	3.8	3.3	3.8	2.7	2.7	3.9	**4.1**	3.1	GLORY
REPELLENT	2.5	3.2	3.0	3.2	3.6	3.6	3.5	3.8	3.8	3.9	3.1	3.4	3.6	3.3	4.0	2.7	2.9	3.5	**4.0**	3.1	INVITING
TIRING	2.7	3.1	3.1	3.3	3.8	3.7	3.6	4.0	3.6	3.9	3.2	3.1	3.5	3.2	**4.1**	3.0	3.2	3.4	3.8	3.4	RELAXING
MYSTERIOUS	2.9	3.6	3.4	3.7	3.7	3.9	3.6	3.8	3.9	4.0	3.5	3.6	3.8	3.2	4.1	3.0	3.5	3.7	**4.3**	3.5	APPARENT
DISTURBING	2.8	3.3	3.2	3.3	3.8	3.7	3.7	3.9	3.7	3.9	3.2	3.2	3.7	3.3	3.9	2.9	3.0	3.7	**4.1**	3.3	DELIGHTING
BLURRY	2.9	3.2	3.1	3.4	3.6	3.7	3.5	3.8	3.7	3.9	3.5	3.4	3.8	3.3	3.6	2.7	3.2	3.7	**4.1**	3.4	CLEAR
DRAINING	3.1	3.2	3.4	3.4	3.7	3.6	3.6	3.8	3.8	3.9	3.4	3.5	3.7	3.3	3.8	2.9	3.3	3.7	**4.0**	3.3	COOLING

Negative Adjective [0-1.5 range: Very; 1.5-2.5 range: Slightly] ; 2.5-3.5 range: Neutral ; [3.5-4.5 range: Slightly ; 4.5-5 range :Very] Positive adjective. The highest values were shown in bold.

Table5: Factor analysis of the landscape value of the urban waterspaces

Items	*Factor loadings*				*Communality*	*Mean score*
	1	*2*	*3*	*4*		
1. Visual-spatial Effects and Functionality						
Remarkable	**0.83**	0.06	-0.06	0.00	0.70	3.80 ± 1.23
Visual quality	**0.82**	-0.02	0.01	0.04	0.68	3.74 ± 1.25
Differences	**0.82**	0.03	-0.11	0.06	0.69	3.89 ± 1.15
Visual appeal	**0.81**	-0.07	0.04	0.02	0.66	3.72 ± 1.23
Interesting	**0.81**	-0.06	-0.07	0.09	0.67	3.90 ± 1.16
Originality	**0.79**	-0.06	-0.03	0.15	0.65	3.78 ± 1.17
Emphasis-focus, visual symbolize	**0.79**	-0.04	0.01	0.07	0.62	3.71 ± 1.19
Harmonizing with urban	**0.75**	-0.06	0.01	0.07	0.57	3.68 ± 1.17
Local image	**0.69**	-0.10	0.07	0.21	0.53	3.69 ± 1.24
Relaxing/comforting	**0.68**	-0.05	0.02	0.24	0.52	3.59 ± 1.24
Router, continuity	**0.66**	-0.16	0.23	0.21	0.55	3.42 ± 1.20
Linkage- separating	**0.65**	-0.14	0.28	0.12	0.53	3.40 ± 1.24
Natural vision	**0.62**	-0.08	-0.02	0.35	0.51	3.58 ± 1.31
2. Arrangement						
Maintenance	-0.05	**0.89**	0.18	0.07	0.84	2.76 ± 1.42
Redesign	-0.16	**0.86**	0.25	0.11	0.84	2.70 ± 1.41
3. Usege and Degradation						
Surrounding usage	0.00	0.17	**0.86**	0.07	0.78	2.48 ± 1.28
Degradation	0.02	0.24	**0.84**	0.09	0.77	2.46 ± 1.27
4. Ecological Value						
Wildlife	0.16	0.17	0.05	**0.80**	0.69	2.89 ± 1.47
Plant diversity	0.19	0.02	0.12	**0.79**	0.68	2.83 ± 1.60
% of variance	40.88	13.46	5.91	5.34	65.59	

all factors loading Ã 0.4

that the visual-spatial effects and functionality of water spaces are important factors in context to Edirne city.

This section of the questionnaire was also tested for internal consistency. The coefficient of reliability indicates a high level of internal consistency for the factors (Cronbach's alpha value 0.879). Thus, the validation of the factor analysis was statistically significant.

This study reveals the perception and user preferences of water compositions in open, green areas in Edirne. Water movements are attractive for people for being diverse and continuous. In perceptional studies that have been carried out since the 1960s (Zube 1974; Ulrich 1981-1983; Yang and Brown 1992; Svobodova et al. 2015) it was asserted that water had a strong impact on spatial perception. The studies compared places with and without water, and revealed both, psychological and physiological benefits. The movements of water in different speeds may impress, soothe and entertain people (Sorvig 1991). Places described with water draw people's attention and create a fairer environment (Ren and Kang 2015; Ren et al. 2015; Watts and Pheasant 2015). It increases participation and excitement (Lin 2015). The fact that water increases visual satisfaction was put forward in Campbell's study (1994). The results of this study have also revealed that water compositions add a positive value to landscape. In urban, open areas water is of great value because of its aesthetic value, emotional encouragement, social function and psychological benefits (Huang 1998; Lin 2015). Calmness-peevishness, similarity-difference, continuity in its flow, change and renewal are some of the magnifying features of water. In the study carried out by Ulrich (1981), the psychological effects of natural and artificial environments were investigated. In the mentioned study, the subjects were shown nature samples consisting of water, nature samples consisting of plants and city ones consisting of plant-intensive, water-intensive samples, were presented and it was found that water had a relaxing effect, lessened mental fatigue and relieved anger (Campbell 1994). This paper reveals the visual quality of waterscapes. Given the lack of the number of studies related to the visual attraction of waters, a detailed discussion could not be held.

The predictions of scientists (Whyte 1980; Booth 1983; Treib 1987; Dillon 1991; Hannebaum 1998) regarding the human reactions to water features differ frequently. Booth (1983) reported that moving water awakened people and Hannebaum (1998) asserted that water was a source of relaxation. Sorvig (1991) stated that water caused resplendent, soothing or encouraging, gloomy thoughts. However, researchers agree that water have soothing effects. Booth (1983) stated that water made people feel calm and relieved, and Hannebaum (1998) stated that waters made people feel calm. Nasar and Lin (2003) found still waters more soothing and moving waters more exciting than still waters. The results of this study show similarities with these studies. Unsurprisingly, still waters were found to be more relaxing, peaceful and providing tranquility and calmness. In the study carried out by Herzog and Bosley (1992), wide water surfaces scored highest with regard to tranquility whereas fast-moving waters were preferred more. While the noise and flow of water lessens tranquility, it increases preference. In this study, water scenes that have wide water surfaces and quiet or low voice water scenes obtained the highest percentages with regard to tranquility, and according to the Variance analysis results, meaningful differences were found ($p=0.000$).

CONCLUSION

This paper reveals the perception and user preferences of water compositions in open, green areas in Edirne. Consequently, while the designer designs the places, she/he should consider user preferences, space features and comprehend their mutual relationships and reflect these on her/his design. Making use of visual, auditory and therapeutic effects of water in urban, open, green areas contribute to the space aesthetically and functionally. Waters are one of the design elements that increase the visual quality of the area. Wide water surfaces have a relaxing and soothing effect on people. Using architectural elements together with water and the flow of water on these architectural elements create a sense of excitement and calmness. When the landscape values of water compositions were examined, it was found that these areas had a high rate of 'visual-spatial effects and functionality' and had features such as 'arrangement', 'usage and degradation' and 'ecological value'. Still waters create feelings of calmness and tranquility. Natural and almost natural water compositions are preferred more and create a sense of tranquility on users.

RECOMMENDATIONS

Water has an important impact on environmental perception. The spaces that are defined with water elements grab people's attention easily and create more readable environments in the landscape. Water elements are being used often in landscape projects with different sizes and forms because water is a source of pleasure and is relaxing, which appeals to both eyes and ears. Designs, which are related with water, constantly attract people's attention. However, nowadays the usage of water in urban areas that are designed and applied unconsciously, is not giving the right impact as aimed to be on the environment and people. Based on this problem, the paper focuses on the evaluation of landscape perception of the water compositions that currently exist in different urban areas. According to this study's results, it was found that waterscapes, which show different qualities from the others, create different impacts and when they are scrutinized from the point of landscape architecture, the waterscapes produced high values in visual-spatial effects and functionality criteria.

In order to create livable designed spaces, they need to meet with human necessities. Designers should not ignore people's psychological and physiological needs when they design spaces. The spaces, which are not able to meet with the user's needs and demands, are dead spaces. Meeting with the human requirements are mandatory for creating livable spaces. Thus, how people are affected psychologically from a space and spatial elements needs to be revealed. In order to produce living designs, planning the spatial components, psychological impacts and user's spatial preferences should be considered. This study reveals that natural or nature-identical waterscapes, wide water surfaces and the waterscapes, which are calm or having low levels of sound, creates a tranquility effect on people.

Water composition form and size should be determined according to what kind of feelings the users want in the area. The results of the paper will be useful for designers to propose solutions more deliberatively according to the

effects, which they would like to give users. Furthermore, future water compositions that are designed according to the results of this study will hopefully make a greater impact on the environment.

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