



Relationships between visual preference of waterscapes and eating and drinking activity

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Abstract

Although the water formations were used functionally to cover the needs of ancient societies, the aspect of these formations that cool, psychologically relax, and rest people has been noticed in our today's world, and has become an indispensable element in recreation areas. It was noticed that different waterscapes create different effects and attract people to the area, and water composition preferences have come to the forefront depending on the place and the activity performed in that particular place. Which water compositions are desirable or undesirable to perform eating and drinking activities were investigated in this study besides the functional use of the water element along with how it affects people in psychological terms. A total of 20 different images of waterscapes in the city of Trabzon were used in the study, a questionnaire was applied to 100 people, and the relations between the characteristics of water and eating and drinking activities were uncovered. It was found that waterscapes with high visual quality were preferred more for eating and drinking activities in the study. Landscape attributes of the waterscape, which have a positive and negative effect on visual quality, were revealed. And common characteristics of waterscapes that were preferred for eating and drinking activities were determined.

Keywords Psychological effect of water · Water and activity · Waterscapes eating and drinking activity · Waterscape · Water feature

Introduction

Water has been an indispensable element in the life of living things in the process from the time of the existence of the world to our present time, and it will continue to be so in the future. This valuable resource, which is at the center of all living things, has also been shaping the history of civilization from the past to our present time in many aspects. The first settlements were established on watersides, and people living as nomadic tribes started the agricultural activities, which were only possible with water establishing their settled living areas on watersides. “Water”, which is among the most basic needs of humans from the early ages to our present time, has shaped the history of civilization as a part of daily life, a determinant in selecting areas, its usage in agricultural activities, participating in the design of living

spaces, and usage for visual purposes in the following periods (Sakıcı, 2020). It is an undeniable fact that human life and urban structure cannot be imagined without water. It is already known that water has a quality, which entertains, relaxes in psychological terms, comfortable, and sometimes has a monumental meaning in the urban structure as well as its agricultural usage, drinking and hygienic uses. It has been the focal point of different expressions and usage areas in every period, every society, and every geographical area, which were affected by the climate, landforms, and cultural characteristics of the areas it existed (Muratoğlu, 2010).

The use of water is extremely common in urban sphere. Green areas make significant contributions to the urban landscape, especially in terms of visual characteristics. How people perceive the environment and what they choose to consider and remember mostly can be determined and measured by their landscape preferences (Abkar et al., 2011). Landscape perception is considered as the subcategory of environmental perception, and as the function of the interaction between individuals and the landscape (Zube et al., 1982). Landscape quality stems from the relations between landscape characteristics and the effects of these on

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individuals (Daniel, 2001). Many studies were conducted in the past on the aesthetic quality of urban landscapes (Abkar et al., 2011; Acar & Sakıcı, 2008; Bernasconi et al., 2009; Chen et al., 2009; Galindo & Hidalgo, 2005; Polat & Akay, 2015; Wong & Domroes, 2005). Previous studies showed that water also increases the aesthetic quality of the urban sphere acting as a magnet attracting people and creating focal points for activities.

With its numerous characteristics such as serenity, movement, sound, optics, joy, cooling, recreation, color, and light, water is a versatile, active, and exciting design element in landscape architecture studies (Rees & May, 2002; Tanrıverdi, 2001). According to Owen (1991), water itself offers a wonderful potential for activity, and according to Booth (1983), large water surfaces create a cooling effect in their surrounding areas during summer. Water has a relaxing and stress-relieving effect with its therapeutic characteristic in places where it exists (Xie et al., 2021). Water elements that have various shapes and sizes are flexible enough to be applied to parks and gardens easily, and thus, become the focus of attention even in small-size usage areas.

In landscape, urban open and green spaces, and in other usage areas, water element use is divided into two as still water and running water. Still water consists of flat, static, quiet, and still waters, but running water consists of flowing, falling, and spilling waters that are brought into motion with the help of steps, cascades, slopes, fountains, and jets (Booth, 1983; Sakıcı & Var, 2014). Examples of still water are pools, lakes, and ponds, and running water samples can be named as waterfalls, cascades, streams, and fountains. Previous studies reported that people like waters (McCulley, 1976; Ulrich, 1983), and stated that reactions of people differ depending on whether the water is active or still (Booth, 1983; Dillon, 1991; Hannebaum, 1998; Whyte, 1980; Sakıcı, 2014). The results of studies show similarity in that still waters have calming and sedative effects (Booth, 1983; Hannebaum, 1998; Sakıcı, 2015). There are study results showing that running waters have effects such as waking people up (Booth, 1983), comfortable (Hannebaum, 1998), attracting attention, soothing, or encouraging (Sorvig, 1991), causing gloomy thoughts. Nasar and Lin (2003) argued that still waters are more calming, and running waters are more exciting than still waters. In the study of Herzog and Bosley (1992), it was reported that wide water surfaces create an effect of tranquility, but waters that flow fast are more preferred. Although the noise and rapid flow of water increased the preference, it also reduced the peace effect (Sakıcı, 2015).

The water element, which has an extremely important role in terms of Landscape Architecture, causes different effects in terms of its visual, auditory, formal, physical, and psychological characteristics and different uses. Water

elements may vary depending on the activity performed in the field. In the present study, which was conducted on the association of water elements with recreational activities, the issue of which water formations have high visual quality and waterscapes that had different characteristics were evaluated with the help of attribution pairs. In the study, the purpose was also to uncover the reasons why people want to perform eating and drinking activities with what kind of water formations, which characteristics of waterscapes are considered in eating and drinking activities, and which waterscapes that have different characteristics for eating and drinking activities are most preferred and which ones are not preferred.

Material and method

The study was conducted in the city of Trabzon in Turkey. Approximately 100 different waterscapes, natural and artificial, were viewed with the help of a camera in the scope of the study, and 20 waterscape images that had different characteristics were selected for evaluation by the subjects. To minimize the effects of seasonal changes and light differences, all photos were taken in the spring between 14:00 and 16:00. A psychophysical method was used in the present study to evaluate the visual quality of waters (Zube et al., 1982; Brown & Daniel, 1986; Taylor et al., 1987; Daniel, 1990; Wherrett, 2000; Bernasconi et al., 2009). This method provides a compromise between perception-based and expert-based methods. A measurement scale was created to find the current characteristics of waters by making use of the studies of Clay and Daniel (2000), Nasar and Lin (2003), Clay and Smidt (2004), Acar et al. (2006), Acar and Sakıcı (2008), Barnasconi et al., 2009; Abkar et al. (2011), Sakıcı (2014), Sakıcı (2015), Polat and Akay (2015) and variables were determined on the basis of mean scores according to this measurement scale by means of expert method (Table 1). Four main characters, i.e. the characteristics of the area where the water is located, the characteristics of the water, the use of water, spatial elements, and components in the area were identified to be used in the questioning of waters in this scale, and 19 sub-characters were identified to question these characteristics. The photographs were divided into 100 equal units using Photoshop, Photo Filter Studio X, and evaluated in this way to evaluate the spatial elements and components. A total of 20 waterscapes were scored in terms of these characteristics to determine the relations between the determined properties of the waters, and visual quality (Polat & Akay, 2015), and eating and drinking efficiency (Table 2).

A photo-questionnaire method was used to evaluate the landscape perception of water compositions. A

Table 1 Measurement scale of waterscapes attributes and elements

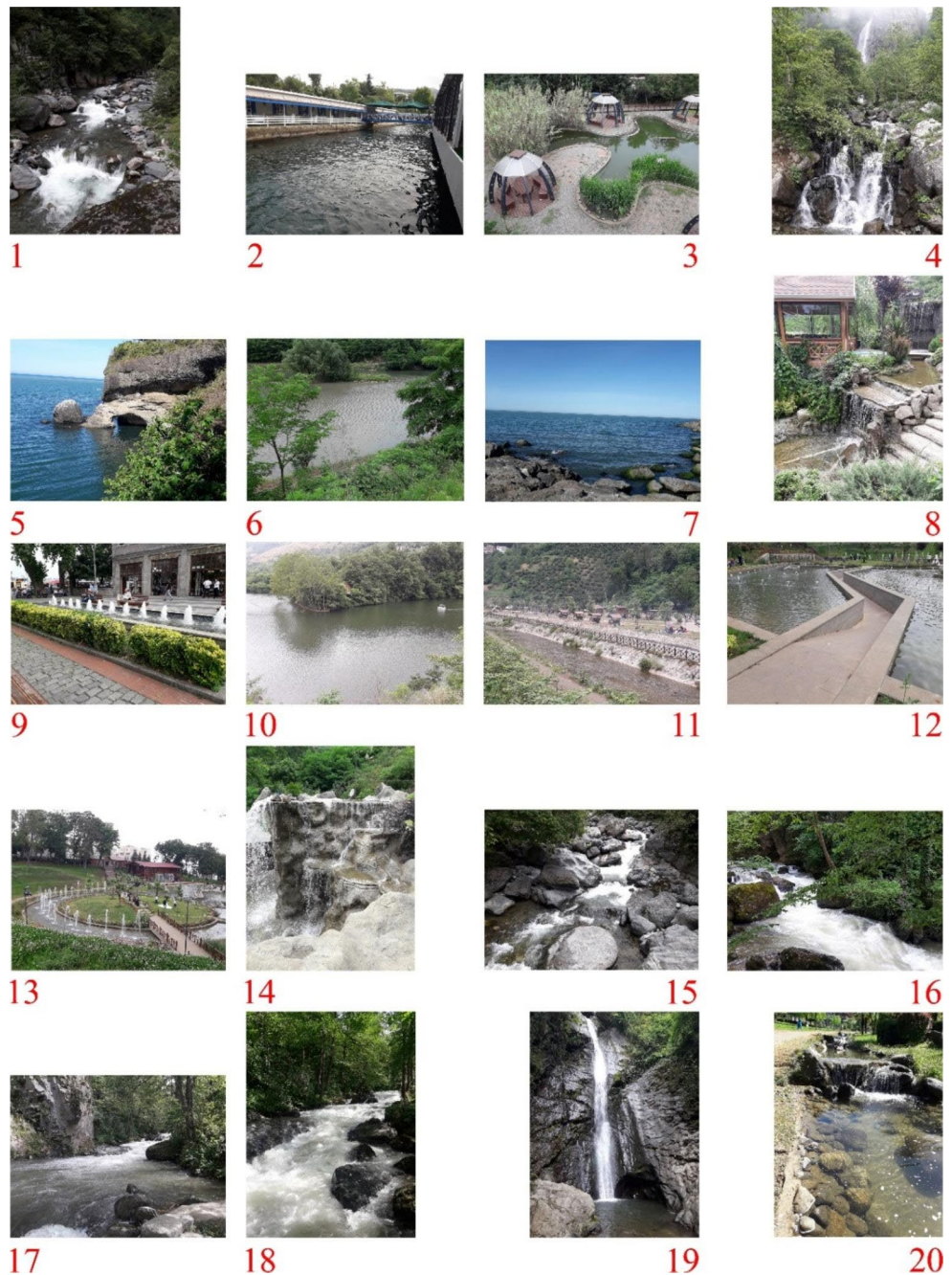
| Type and subtype characteristics of waterscapes | Abbreviation | Scoring | | | | |
|---|--------------|-------------------------|-------------------|-----------------|-------------------|---------------|
| | | 1 | 2 | 3 | 4 | 5 |
| A. Characteristics of area | | | | | | |
| 1. Degree of wilderness | DWIL | natural | natural-looking | artificial | | |
| 2. Type of topography | TOPO | Almost flat | low slope | medium slope | very slope | upright slope |
| B. Characteristic of the water | | | | | | |
| 3. Water movement | MOVE | Still | Still looking | Little moving | Middle moving | Much moving |
| 4. Flow direction of water | FLOW | none | flowing | falling | Jet and fountains | |
| 5. Water flow | WFLO | none | regular | irregular | | |
| 6. Shape of the fall of water | SHFA | none | free-fall | obstructed fall | sloped fall | |
| 7. Shape of water | SHAP | geometric, formal | organic, informal | | | |
| 8. Amount of water deepness | DEEP | shallow | medium | deep | | |
| 9. Color of water | COLO | light | dark | | | |
| 10. Noise of water | NOIS | quiet | low voice | middle voice | too voice | |
| 11. Position of water | POSI | level of ground | lower | higher | | |
| C. Usege of the water | | | | | | |
| 12. The composition of water | COMP | with artificial element | with plant | with rocky | mix | |
| 13. Type of vegetation | TVEG | none | herbaceous | trees | mix | |
| D. Spatial Elements and Components | | | | | | |
| 14. Amount of water scale | WATE | Yok | 0–25% | 25–50% | 50–75% | 75–100% |
| 15. Amount of rock scale | ROCK | Yok | 0–25% | 25–50% | 50–75% | 75–100% |
| 16. Amount of vegetation scale | VEGE | Yok | 0–25% | 25–50% | 50–75% | 75–100% |
| 17. Amount of grass scale | GRAS | Yok | 0–25% | 25–50% | 50–75% | 75–100% |
| 18. Amount of soil scale | SOIL | Yok | 0–25% | 25–50% | 50–75% | 75–100% |
| 19. Amount of artificial element scale | ARTI | Yok | 0–25% | 25–50% | 50–75% | 75–100% |

questionnaire is the most preferred study method for determining the effects of natural areas and landscaped environments on users, and has been used by many researchers (Marcus & Barnes, 1995; Ghose, 1999; Whitehouse et al., 2001; Zimring, 2002; LaFargue, 2004; Sherman et al., 2005; Acar & Sakıcı, 2008; Sakıcı, 2014). The questionnaire consisted of five parts. In the first part, the demographic characteristics of the users were questioned, the visual quality of the water landscape images and the effects on the users with the help of attribute pairs (Nasar & Li, 2004; Nasar & Lin, 2003; Ekman et al., 2015, Sakıcı, 2014) were determined in the second part by using a 5-point Likert design. In the third and fourth sections, the waterscapes images they liked the most and the worst were questioned along with the reasons in terms of the eating and drinking activity; and in the last section, the users were asked about the water images where they could perform the eating and drinking activity. Statistical analyzes were used to determine which characteristics of the area and water increased visual quality, whether the demographic characteristics of the users had effects on their preferences, and which of these characteristics were

effective when the users performed eating and drinking activities.

Visualizations were made use of in the study, as it would not be possible for the subjects to take the questionnaires one by one to 20 different water elements in different parts of the city. The representative validity of the images in assessing the landscape quality was proven in many previous studies (Acar & Sakıcı, 2008; Clay & Daniel, 2000; Craik, 1983; Daniel & Boster, 1976; Hershberger & Cass, 1974; Hull IV & Stewart, 1992; Kellomaki & Savolainen, 1984; Law & Zube, 1983; Nasar, 1990; Nasar & Lin, 2003; Palmer & Hoffman, 2001; Stamps, 1993; Stewart et al., 1984; Trent et al., 1987; Wang et al., 2019; Zhao et al., 2018; Zube, 1974; Zube et al., 1987). However, images and slides lack dynamic environmental conditions such as motion and sound. For this reason, there are studies reporting that it does not fully represent the environment (Xie et al., 2021). Brown and Daniel (1991) found systematic differences between static and dynamic environment expressions stating that static icons e.g. slides and photographs cannot adequately express dynamic environmental characteristics like

Fig. 1 The images of waterscapes evaluated in the study



river flows, but dynamic icons e.g. camera images reveal the details of the flow. Also, Anderson et al. (1983) and Hetherington’s (1991) study results showed that sound and movement are effective in landscape preferences. For this reason, camera images were used (regular) to determine the effects of the sound and movement of water (Düzenli et al., 2014; Sakıcı, 2014; Sakıcı, 2015), and images were used to remind the images again in the study. The waterscapes that were evaluated in the scope of the study are shown in Fig. 1.

Results

Demographic profile

A total of 100 field users participated in the questionnaire that was conducted to evaluate waters. The respondents were chosen on a completely voluntary basis, and 51% of them were women, 11% were children who were aged 18 and under, 47% were young people who were aged 18–40, and 42% were elderly people who were aged 40 and over. When examined in terms of educational status, it was found

that 17% had Primary School degrees, 14% Secondary School, 34% High School, 31% University, and 4% Post-graduate Education degrees.

Visual quality and characteristics of the urban waterspace

Waterspaces in Trabzon city were evaluated according to the measurement scale explained in Material and Methods Section in expertness approach. Table 2 indicates the visual quality scores and characteristics of waterspaces in Trabzon city. The average participant scores of visual quality of each waterspaces in photo-questionnaire were calculated. The visual quality score of all waters was above 3 on a 5-point Likert Scale. Although waterscape 5 had the highest visual quality with a score of 4.68, the water image 2 had the lowest visual quality with a score of 3.19.

The Chi-Square Test was conducted to determine whether demographic characteristics such as age, gender, and educational levels of the users had effects on the visual quality score of water formations. It was revealed that gender, education and age had an effect on the visual quality of 6, 4 and 3 waterspaces, respectively. The results are shown in Table 3.

Table 4 indicates correlation results between visual quality and landscape attributes of the waterspace. According to these results, there are positive correlations type of topography (TOPO) ($r=0,58$), noise of water (NOIS) ($r=0,49$) and amount of rock scale (ROCK) ($r=0,45$) with visual quality and there are negative correlations amount of water deepness (DEEP) ($r = -0,44$) and amount of artificial element scale (ARTI) ($r = -0,45$) with visual quality at 0.05 significant level.

Table 5 indicates Spearman's rho correlation results of the landscape attributes of the waterspace. According to the correlation analysis, positive correlations were found between 22 landscape attribute pairs while negative correlations between 3 pairs at 0,01 significant level. Positive correlations at 0.01 significant level: DWIL/ARTI ($r=0,77$); TOPO/MOVE ($r=0,80$); TOPO/FLOW ($r=0,60$); TOPO/WFLO ($r=0,83$); TOPO/SHFA ($r=0,76$); TOPO/NOIS ($r=0,77$); TOPO/ROCK ($r=0,70$); MOVE/FLOW ($r=0,78$); MOVE/WFLO ($r=0,87$); MOVE/SHFA ($r=0,77$); MOVE/NOIS ($r=0,92$); MOVE/POSI ($r=0,66$); MOVE/ROCK ($r=0,62$); FLOW/WFLO ($r=0,64$); FLOW/SHFA ($r=0,72$); FLOW/NOIS ($r=0,67$); WFLO/SHFA ($r=0,73$); WFLO/NOIS ($r=0,88$); WFLO/ROCK ($r=0,64$); SHFA/NOIS ($r=0,78$); DEEP/COLO ($r=0,67$); NOIS/ROCK ($r=0,69$). Negative correlations at 0,01 significant level: DWIL/SHAP ($r = -0,74$); COMP/WATE ($r = -0,64$); ROCK/ARTI ($r = -0,57$). The other relationships are shown in Table 5.

Visual perception of waterspaces

The spaces, which cannot fulfill the wishes and preferences of the users, are dead spaces. It is necessary to meet the needs of people to create living spaces. For this reason, it is important to find out how people are psychologically affected by a place and its components. A total of 9 attribute pairs were used in the second part of the questionnaire to determine the effects of waterspaces on users; and a 5-point Likert Scale was used to evaluate these attribute pairs by the participants. Negative attribute pairs were perceived as 1 point, medium perceived as 2 points, indecision status was evaluated as 3 points, positive attribute was perceived as moderately perceived as 4 points, and highly perceived as 5 points in the scale. According to the results, the water images 5, 19, and 4 were the most beautiful images with an average of 4.68, 4.66, and 4.55 points, respectively; and the most relaxing water images had the averages of 4.52, 4.51, and 4.28 points, the most effective and energetic images had the averages of 4.56, 4.55, and 4.43 points, the most enjoyable images had 4.54, 4.53, and 4.42 points on average, the most different and mysterious images had 4.44, 4.30, and 4.14 point on average, the most inviting and attractive water images had the averages of 4.55, 4.49 and 4.34 points, the safest images had the averages of 4.30, 4.23, and 4.20 points, the water images 8, 20, 3, 19, 5, and 17 were the simplest and most understandable with the averages of 4.51, 4.40, and 4.13, the water images 19, 4, and 5 were the clearest waterspaces with averages of 4.56, 4.53, and 4.40 points. All water images were characterized by positive attributes over 2.5 points for all attribute pairs, only the water image 6 received a negative value of 2.31 points in the clarity and turbidity attribute pair. The average values for each attribute pair are shown in Table 6. Waterscape 19 had the highest average in terms of being effective, enjoyable, understandable, different, inviting-attractive, and clear, waterscape 5 in terms of beautiful and relaxing, and waterscape 6 in terms of being safe.

Preferences for urban waterspaces in Trabzon city

The opinions of participants on 20 waterscape scenes taken from Trabzon city depending on eating and drinking activity were investigated in Fig. 2. Because of visual appeal (40%), natural appearance (39%) and relaxing effect (11%), Scene 5 is the most preferred picture (26%) depending on eating and drinking activity. Following it are Scene 19 and Scene 4, the former has 17% rate and the latter has 11%. These Scene 5 (VQ=4,68), Scene 19 (VQ=4,66) and Scene 4 (VQ=4,55) waterspaces are also the water images with the highest visual quality. On the other hand, Because of bad image (46%), abandoned image (19%), disturbances in

Table 2 Assessment of visual quality scores and characteristics of waterscapes

| Waterscapes | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|-------------|------|------|------|------|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| VQ | 3,89 | 3,19 | 3,91 | 4,55 | 4,68 | 3,46 | 4,05 | 4,15 | 3,72 | 3,75 | 3,36 | 3,71 | 4,19 | 4,11 | 3,88 | 4,50 | 4,31 | 4,45 | 4,66 | 3,91 |
| Std.Dev. | 0,71 | 1,07 | 1,03 | 0,58 | 0,65 | 0,10 | 0,81 | 0,82 | 1,07 | 0,98 | 1,19 | 1,11 | 0,92 | 0,94 | 1,09 | 0,69 | 0,80 | 0,63 | 0,52 | 0,90 |
| DWIL | 1 | 3 | 3 | 1 | 1 | 1 | 1 | 2 | 3 | 1 | 1 | 3 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 2 |
| TOPO | 2 | 1 | 1 | 5 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 5 | 3 | 3 | 2 | 4 | 5 | 1 |
| MOVE | 3 | 2 | 1 | 5 | 2 | 2 | 2 | 2 | 4 | 1 | 2 | 3 | 1 | 4 | 4 | 4 | 3 | 4 | 5 | 1 |
| FLOW | 2 | 1 | 1 | 3 | 1 | 1 | 1 | 3 | 4 | 1 | 1 | 4 | 1 | 3 | 2 | 2 | 2 | 2 | 3 | 1 |
| WFLO | 3 | 2 | 1 | 3 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 1 | 3 | 3 | 3 | 3 | 3 | 3 | 1 |
| SHEA | 4 | 1 | 1 | 4 | 1 | 1 | 1 | 3 | 2 | 1 | 1 | 2 | 1 | 2 | 4 | 4 | 1 | 4 | 2 | 1 |
| SHAP | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| DEEP | 2 | 3 | 1 | 2 | 2 | 3 | 3 | 1 | 2 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 |
| COLO | 1 | 2 | 1 | 2 | 1 | 2 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2 |
| NOIS | 3 | 1 | 1 | 4 | 2 | 1 | 2 | 1 | 3 | 1 | 1 | 3 | 1 | 3 | 4 | 4 | 3 | 4 | 4 | 1 |
| POSI | 2 | 2 | 1 | 3 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 1 | 1 | 3 | 2 | 2 | 1 | 2 | 3 | 1 |
| COMP | 3 | 2 | 4 | 4 | 4 | 4 | 3 | 4 | 4 | 2 | 4 | 4 | 4 | 3 | 4 | 4 | 3 | 4 | 4 | 2 |
| TVEG | 4 | 4 | 2 | 3 | 2 | 4 | 1 | 4 | 4 | 3 | 3 | 1 | 4 | 3 | 3 | 3 | 1 | 3 | 4 | 1 |
| WATE | 3 | 4 | 2 | 2 | 3 | 3 | 3 | 2 | 2 | 4 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 2 |
| ROCK | 3 | 1 | 1 | 3 | 2 | 1 | 2 | 2 | 1 | 1 | 2 | 2 | 1 | 2 | 4 | 2 | 3 | 2 | 4 | 2 |
| VEGE | 3 | 2 | 3 | 3 | 3 | 4 | 1 | 3 | 3 | 3 | 4 | 2 | 3 | 2 | 2 | 3 | 3 | 3 | 3 | 2 |
| GRAS | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2 |
| SOIL | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 |
| ARTI | 1 | 2 | 3 | 1 | 1 | 1 | 1 | 2 | 4 | 2 | 2 | 3 | 2 | 4 | 1 | 1 | 1 | 1 | 1 | 1 |

Table 3 Relationships between user demographic features and visual quality of waterscapes

| Photo No | Gender | | Age | | Education | |
|----------|----------|---------------|----------|--------------|-----------|---------------|
| | χ^2 | <i>p</i> | χ^2 | <i>p</i> | χ^2 | <i>p</i> |
| 1 | 1,82 | 0,61 | 7,38 | 0,29 | 8,68 | 0,73 |
| 2 | 12,53 | 0,01* | 17,81 | 0,02* | 18,67 | 0,29 |
| 3 | 7,05 | 0,13 | 10,94 | 0,21 | 23,77 | 0,10 |
| 4 | 3,12 | 0,21 | 1,77 | 0,78 | 11,59 | 0,17 |
| 5 | 7,35 | 0,12 | 5,23 | 0,73 | 34,99 | 0,00** |
| 6 | 7,36 | 0,12 | 2,39 | 0,97 | 22,57 | 0,13 |
| 7 | 26,38 | 0,00** | 2,81 | 0,83 | 11,74 | 0,47 |
| 8 | 17,74 | 0,00** | 5,72 | 0,68 | 26,88 | 0,04* |
| 9 | 11,65 | 0,02* | 17,69 | 0,02* | 35,42 | 0,00** |
| 10 | 5,03 | 0,28 | 3,80 | 0,88 | 21,62 | 0,16 |
| 11 | 11,95 | 0,02* | 11,12 | 0,20 | 30,67 | 0,02* |
| 12 | 8,92 | 0,06 | 13,43 | 0,10 | 18,25 | 0,31 |
| 13 | 6,70 | 0,14 | 16,63 | 0,03* | 21,20 | 0,17 |
| 14 | 10,34 | 0,04* | 13,67 | 0,09 | 11,35 | 0,79 |
| 15 | 7,26 | 0,11 | 8,62 | 0,38 | 14,31 | 0,58 |
| 16 | 3,22 | 0,36 | 3,76 | 0,71 | 7,36 | 0,83 |
| 17 | 4,58 | 0,33 | 8,90 | 0,35 | 17,15 | 0,38 |
| 18 | 7,79 | 0,05 | 7,54 | 0,27 | 13,41 | 0,34 |
| 19 | 0,33 | 0,85 | 0,80 | 0,94 | 7,54 | 0,48 |
| 20 | 4,69 | 0,37 | 7,18 | 0,52 | 13,90 | 0,61 |

p-value * 0.01 **0.05

the area (10%), and negative effect (10%), Scenes 2, 6 and 11 are the most disliked pictures; their rates are 22%, 16% and 14% in that order. These Scene 2 (VQ=4,68), Scene 6 (VQ=4,66) and Scene 11 (VQ=4,55) waterscapes have a still looking and little moving on a narrow and long linear line, and are also the water images with the lowest visual quality. Reasons for preference or nor preference of waterscapes were investigated in Fig. 3.

The users were also asked in which water images they would like to perform eating and drinking activities, and number 5 (42% preference), 19 (39% preference), 8 (37% preference), 13 (33% preference), and 4 (30% preference) water images were determined as the most preferred water images for eating and drinking activities respectively. The rate of preference of all water images depending on the eating and drinking activity is shown in Fig. 4.

The characteristics of the first five water images that were preferred for eating and drinking activities were also examined (Table 7), and common characteristics were identified. Waterscapes, which were organic in terms of the characteristic of the water (B), and medium in informal shape (SHAP), and water depth (DEEP) were preferred for eating and drinking activities. In terms of use of the water (C), images that had a mix composition (COMP) e.g. rocky, plant, and artificial elements rather than images that had only water, and images that had a mix of trees, shrubs, and groundcovers in terms of vegetation (TVEG) were used for eating and drinking activities. In terms of Spatial Elements and Components (D), images that had water surface

(WATE) 0–25%, vegetation surface (VEGE) 25–50%, and images without grass (GRAS) and soil (SOIL) surface were preferred more for eating and drinking activities.

Discussion and conclusion

Most studies focus on large bodies of water such as seas, rivers, and lakes; however, studies conducted on waters such as ponds, fountains, and jets, which are used extensively in urban settings, are quite limited. Artificial water are more feasible and accessible restorative elements than natural water. The effects of these waters on urban residents, incentives for activity, and desire to spend more time outdoors were not studied much. Efforts beyond the current focus on aesthetic and decorative characteristics are needed to better understand the behavioral and experiential qualities of various water features (Xie et al., 2021).

In the present study, 20 different waterscapes were identified in Trabzon to examine the relations between water landscapes and eating and drinking activities. When the study areas were determined, attention was paid to show different characteristics of the waters and the areas they were located. Attention restoration theory draws attention to water as an element with a high attractiveness that helps people regain their attention quickly (Kaplan & Kaplan, 1989; Karmanov & Hamel, 2008, White et al., 2010). Waterscapes that had high visual quality also constituted the most popular water images in the study. Waterscapes 5, 19, and 4, which had

Table 4 Correlations between visual qualities and landscape attributes of the waterspaces

| | DWIL | TOPO | MOVE | FLOW | WFLO | SHFA | SHAP | DEEP | COLO | NOIS | POSI | COMP | TVEG | WATE | ROCK | VEGE | GRAS | SOIL | ARTI |
|---|-------|---------------|------|------|------|------|------|--------------|-------|--------------|------|------|-------|-------|--------------|-------|-------|------|---------------|
| r | -0,34 | 0,58** | 0,35 | 0,21 | 0,32 | 0,29 | 0,39 | -0,44 | -0,29 | 0,49* | 0,16 | 0,26 | -0,15 | -0,29 | 0,45* | -0,04 | -0,34 | 0,16 | -0,45* |
| p | 0,15 | 0,01 | 0,13 | 0,38 | 0,18 | 0,21 | 0,09 | 0,05 | 0,22 | 0,03 | 0,51 | 0,27 | 0,54 | 0,22 | 0,04 | 0,88 | 0,14 | 0,49 | 0,05 |

The significant correlations (**p < 0.01 and *p < 0.05 level) are showing bold letters. The nonsignificant correlations (p > 0.05 level) are showing as normal letters

^a Abbreviations of the landscape attributes were given as Table 1

the highest visual quality, created the most admired water images in the scope of this study due to their visual appeal, natural appearance, and relaxing effects. Waterscape 2, that had the lowest visual quality was determined as the most disliked area due to bad and abandoned image, disturbances in the area, and negative effects. The area drew attention as an image in which artificial elements are dominant In terms of spatial elements and components that made up the image. In many studies, it has been revealed that the visual quality of images in which artificial elements are dominant is lower (Düzenli et al., 2014; 2019; Finlay et al., 2015; Sakıcı, 2015; Xie et al., 2021). It was shown by many previous studies that the demographic characteristics of the users are effective in the visual preferences of the landscapes (Bozkurt & Woolley, 2020; Lin, 2002; Nasar & Lin, 2003; Patón et al., 2020; Polat & Akay, 2015; Sevenant & Antrop, 2010). In the study, the effects of age, gender, and educational level differences on visual quality were found.

The presence of water and its restful and relaxing effects encourage people to perform recreational activities in such areas (Heath & Gifford, 2001; Rodiek, 2006; Senes et al., 2012). Baran et al. (2014) reported in their study that was conducted on adolescents that the presence of water in the parks encourages the use of such areas. A positive relation was detected between the frequency and duration of visiting areas that had water and social interaction and psychological benefit (de Bell et al., 2017, White et al., 2013). The characteristics of water features influenced the physical activities around waterscapes (Xie et al., 2021). The characteristics of the water, the movement of it, the green area in the water image, and the area covered by water surface were found to be effective on activities to be performed in these areas (Düzenli et al., 2014; Finlay et al., 2015; Huang, 2009; Sakıcı, 2014; Völker et al., 2016). Water features were found to promote social interactions (Bozkurt, 2019; Düzenli et al., 2019; Finlay et al., 2015). In their study, Düzenli et al. (2014) reported that watching, sitting, talking, and resting activities were preferred in areas that had still water, and activities such as walking, sports, games, and dancing were preferred in areas with active water. It was shown that people were attracted to watch and listen to water features (Finlay et al., 2015), and at the same time, they engaged in many activities (Düzenli et al., 2014, Finlay et al., 2015; Huang, 2009, Sakıcı, 2014; Xie et al., 2021; Völker et al., 2016). There is a relationship between visual character and recreational experience (Daniel and Vining, 1983). In the study, the characteristics of water were found to be effective on the desire to eat and drink in an area. It was also determined that waterscapes 5, 19, 8, 13, and 4 were the most encouraging in terms of eating and drinking activities. When the characteristics of these waters were examined, it was found that the characteristics of the area (A) features

Table 5 Correlation analysis of the landscape attributes of the waterspace

| | DWIL | TOPO | MOVE | FLOW | WFLO | SHFA | SHAP | DEEP | COLO | NOIS | POSI | COMP | TVEG | WATE | ROCK | VEGE | GRAS | SOIL |
|------|----------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|-------|---------------|---------------|----------------|-------|-------|----------------|-------|------|-------|
| TOPO | -0,40 | | | | | | | | | | | | | | | | | |
| MOVE | -0,32 | 0,80** | | | | | | | | | | | | | | | | |
| FLOW | 0,12 | 0,60** | 0,78** | | | | | | | | | | | | | | | |
| WFLO | -0,27 | 0,83** | 0,87** | 0,64** | | | | | | | | | | | | | | |
| SHFA | -0,21 | 0,76** | 0,77** | 0,72** | 0,73** | | | | | | | | | | | | | |
| SHAP | -0,74** | 0,43 | 0,09 | -0,16 | 0,09 | 0,14 | | | | | | | | | | | | |
| DEEP | -0,36 | -0,27 | -0,05 | -0,36 | -0,11 | -0,32 | -0,11 | | | | | | | | | | | |
| COLO | -0,03 | -0,28 | -0,15 | -0,22 | -0,28 | -0,35 | -0,30 | 0,67** | | | | | | | | | | |
| NOIS | -0,40 | 0,77** | 0,92** | 0,67** | 0,88** | 0,78** | 0,16 | -0,14 | -0,25 | | | | | | | | | |
| POSI | -0,29 | 0,52* | 0,66** | 0,44* | 0,40 | 0,44 | 0,16 | 0,25 | 0,07 | 0,45* | | | | | | | | |
| COMP | -0,02 | 0,17 | 0,33 | 0,32 | 0,04 | 0,36 | -0,05 | -0,24 | -0,02 | 0,30 | 0,13 | | | | | | | |
| TVEG | 0,11 | 0,16 | 0,17 | 0,16 | 0,10 | 0,26 | -0,26 | 0,15 | 0,16 | -0,06 | 0,47* | 0,20 | | | | | | |
| WATE | -0,13 | -0,41 | -0,37 | -0,41 | -0,18 | -0,38 | -0,07 | 0,43 | 0,19 | -0,28 | -0,31 | -0,64** | -0,24 | | | | | |
| ROCK | -0,56* | 0,70** | 0,62** | 0,44 | 0,64** | 0,54* | 0,47* | -0,23 | -0,20 | 0,69** | 0,21 | 0,08 | -0,19 | -0,21 | | | | |
| VEGE | -0,24 | -0,14 | -0,16 | -0,18 | -0,22 | -0,06 | 0,17 | 0,10 | -0,04 | -0,24 | -0,03 | 0,40 | 0,30 | -0,13 | -0,28 | | | |
| GRAS | 0,24 | -0,50* | -0,53* | -0,28 | -0,47* | -0,39 | -0,29 | 0,10 | 0,41 | -0,45* | -0,48* | -0,15 | -0,22 | 0,16 | -0,27 | 0,05 | | |
| SOIL | -0,21 | -0,12 | -0,11 | -0,24 | -0,25 | -0,18 | 0,25 | -0,07 | 0,05 | -0,13 | 0,04 | 0,05 | -0,32 | -0,05 | 0,19 | 0,19 | 0,29 | |
| ARTI | 0,77** | -0,32 | -0,22 | 0,20 | -0,26 | -0,19 | -0,55* | -0,06 | 0,06 | -0,37 | -0,00 | 0,02 | 0,14 | -0,23 | -0,57** | -0,01 | 0,29 | -0,24 |

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

Table 6 The evaluation of waterscapes with the help of Attribute Pairs by using a 5-point Likert Scale

| Attribute | WATER SCENE NO | | | | | | | | | | | | | | | | | | | | |
|-------------------|----------------|------|------|------|-------------|-------------|------|-------------|------|------|------|------|------|------|------|------|------|------|-------------|------|------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | |
| Attribute | | | | | | | | | | | | | | | | | | | | | |
| Positive | | | | | | | | | | | | | | | | | | | | | |
| Attribute | | | | | | | | | | | | | | | | | | | | | |
| BEAUTIFUL | 3,89 | 3,19 | 3,91 | 4,55 | 4,68 | 3,46 | 4,05 | 4,15 | 3,72 | 3,75 | 3,36 | 3,71 | 4,19 | 4,11 | 3,88 | 4,50 | 4,31 | 4,45 | 4,66 | 4,66 | 4,66 |
| EFFECTIVE | 3,55 | 2,90 | 3,65 | 4,43 | 4,55 | 3,28 | 3,82 | 4,05 | 3,44 | 3,57 | 3,20 | 3,53 | 4,10 | 4,06 | 3,63 | 4,42 | 4,22 | 4,37 | 4,56 | 3,75 | 3,75 |
| DELIGHTING | 3,99 | 3,39 | 3,97 | 4,42 | 4,53 | 3,39 | 4,10 | 4,16 | 3,82 | 3,79 | 3,45 | 3,77 | 4,20 | 4,03 | 3,92 | 4,47 | 4,36 | 4,38 | 4,54 | 3,98 | 3,98 |
| SAFE | 3,70 | 3,33 | 4,20 | 3,51 | 3,72 | 3,00 | 3,33 | 4,30 | 4,28 | 2,87 | 3,82 | 3,82 | 4,27 | 3,56 | 3,32 | 2,92 | 3,05 | 2,79 | 3,48 | 4,23 | 4,23 |
| SIMPLE | 3,72 | 3,83 | 3,96 | 3,75 | 4,40 | 3,53 | 4,06 | 3,62 | 4,17 | 3,98 | 3,70 | 3,78 | 3,83 | 3,53 | 3,66 | 3,96 | 4,13 | 4,00 | 4,51 | 4,09 | 4,09 |
| MYSTERIOUS | 2,76 | 2,73 | 3,67 | 4,14 | 4,30 | 2,94 | 2,84 | 3,88 | 2,91 | 3,16 | 2,97 | 3,68 | 4,02 | 3,90 | 3,12 | 3,88 | 3,84 | 3,90 | 4,44 | 3,33 | 3,33 |
| ATTRACTIVE | 3,80 | 3,27 | 3,82 | 4,34 | 4,49 | 3,21 | 3,79 | 4,02 | 3,64 | 3,62 | 3,36 | 3,72 | 4,12 | 3,97 | 3,69 | 4,19 | 4,09 | 4,21 | 4,55 | 3,87 | 3,87 |
| RELAXING | 4,01 | 3,65 | 3,95 | 4,28 | 4,52 | 3,47 | 4,13 | 4,03 | 3,88 | 3,80 | 3,55 | 3,84 | 4,07 | 3,95 | 3,86 | 4,25 | 4,21 | 4,22 | 4,51 | 4,09 | 4,09 |
| LUCID | 4,34 | 3,46 | 3,28 | 4,53 | 4,40 | 2,31 | 3,92 | 3,91 | 4,07 | 2,80 | 3,10 | 3,59 | 4,02 | 4,15 | 4,29 | 4,12 | 3,84 | 4,02 | 4,56 | 4,04 | 4,04 |

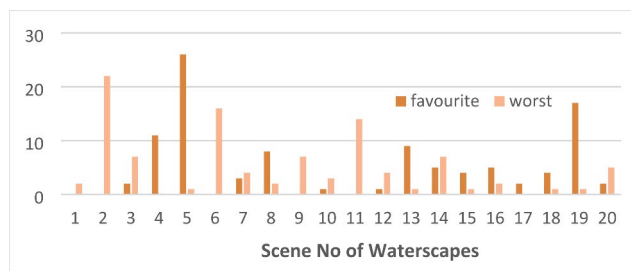


Fig. 2 Preferences of the waterscapes

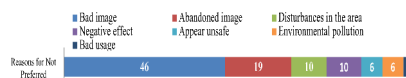


Fig. 3 Reasons for preferring and no preferring water images depending on eating and drinking activity

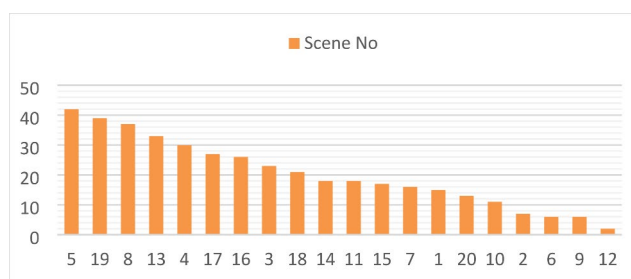


Fig. 4 The percentages of preference of water images depending on eating and drinking activity

such as Degree of wilderness (DWIL) were effective in the desire to perform eating and drinking activity. The characteristics of the area surrounding the water feature played a role in influencing accessibility to and comfort in using the water feature. Völker et al. (2016) found that physical activities were reported more commonly for water features in natural-looking environments than in urban environments. In the present study, all waterscapes that were preferred for eating and drinking activities, except for area 13, were natural or natural-looking. It was also found that Characteristic of the water (B) features such as Shape of water (SHAP) and Amount of water depth (DEEP) were important in eating and drinking efficiency. Organic, informal-shaped and medium-depth waters were preferred more for eating and drinking activities. Duzenli et al. (2014) reported that the way the water acted was effective in the activity preference, but the shape of the fall of water (SHFA) was not an effective characteristic in eating and drinking activity. Also, although there are studies conducted on the negative effects of too-loud-sounding waters (NOIS) (Ngiam et al., 2017; Patón et al., 2020; Ekman et al., 2015), it was not found an important criterion regarding the desire to perform eating and drinking activities. The characteristics on the usage of the water (C) such as The composition of water (COMP) and Type of vegetation (TVEG) were also effective on the preference. The

Table 7 The characteristics of the first five water images preferred for eating and drinking activities

| Type and subtype characteristics of waterscapes | Abbreviation | Preference scene no for eating and drinking activity | | | | |
|---|--------------|--|-------------|------------|-------------|------------|
| | | 5 (42%) | 19 (39%) | 8 (37%) | 13 (33%) | 4 (30%) |
| A. Characteristics of area | | | | | | |
| 1. Degree of wilderness | DWIL | 1 | 1 | 2 | 3 | 1 |
| 2. Type of topography | TOPO | 1 | 5 | 2 | 1 | 5 |
| B. Characteristic of the water | | | | | | |
| 3. Water movement | MOVE | 2 | 5 | 2 | 1 | 5 |
| 4. Flow direction of water | FLOW | 1 | 3 | 3 | 1 | 3 |
| 5. Water flow | WFLO | 1 | 3 | 1 | 1 | 3 |
| 6. Shape of the fall of water | SHFA | 1 | 2 | 3 | 1 | 4 |
| 7. Shape of water | SHAP | 2 | 2 | 2 | 1 | 2 |
| 8. Amount of water deepness | DEEP | 2 | 2 | 1 | 2 | 2 |
| 9. Color of water | COLO | 1 | 2 | 1 | 2 | 2 |
| 10. Noise of water | NOIS | 2 | 4 | 1 | 1 | 4 |
| 11. Position of water | POSI | 2 | 3 | 2 | 1 | 3 |
| C. Usage of the water | | | | | | |
| 12. The composition of water | COMP | 4 | 4 | 4 | 4 | 4 |
| 13. Type of vegetation | TVEG | 3 | 4 | 4 | 4 | 3 |
| D. Spatial Elements and Components | | | | | | |
| 14. Amount of water scale | WATE | 3 | 2 | 2 | 2 | 2 |
| 15. Amount of rock scale | ROCK | 2 | 4 | 2 | 1 | 3 |
| 16. Amount of vegetation scale | VEGE | 3 | 2 | 3 | 3 | 3 |
| 17. Amount of grass scale | GRAS | 1 | 1 | 1 | 2 | 1 |
| 18. Amount of soil scale | SOIL | 2 | 1 | 1 | 1 | 2 |
| 19. Amount of artificial element scale | ARTI | 1 | 1 | 2 | 2 | 1 |

images that had mixed composition of water and vegetation with mixed composition were preferred for eating and drinking activities. The contribution of water and vegetation to the visual quality of the landscape was shown by many studies (Herzog and Barnes, 1999; Purcell et al., 1994; Polat and Akay, 2015; Wong and Domroes, 2005). Previous studies also showed that landscapes that had mixed vegetation structure were preferred more (Avižienė et al., 2007; Bernasconi et al., 2009; Hunziker, 1995; Uzun & Muderrisoglu, 2011; Zube et al., 1987). The results of this study fully agree with these findings. Spatial Elements and Components (D) on the characteristics such as Amount of water scale (WATE), Amount of vegetation scale (VEGE), Amount of grass scale (GRAS), and Amount of soil scale (SOIL) were effective on the preference. Volker et al. (2016) determined that the percentage of green and blue space was effective on preferences. Although wide water surfaces an effective factor in landscape preference (Acar et al., 2006; Polat and Akay, 2015), low water surface (0–25%) elements were preferred more for eating and drinking activities; however, they were not close to the water surface. The compositions that had other elements such as plants and rocks mixed came to the forefront for eating and drinking activities, and areas that do not have the appearance of soil and grass or were very slightly visible (0–25%) were not preferred.

As a conclusion, it was determined that when users choose areas where they want to perform eating and drinking activities, they prefer areas that have natural view, visual appeal, and relaxing effect. In the study, the area occupied by the spatial elements and components that constituted the waterscapes and the compositions emerged as effective factors for the users to prefer such areas. In the study, the effects of the relations between the presence of water, spatial elements and components that constituted the areas and the eating and drinking activity were determined. In this way, it was shown with the help of this study that when water compositions are designed in areas, it is important to make choices depending on the activity to be performed there. The contents of the study must be developed with more detailed studies to be conducted in the future and must be disseminated in terms of importance.

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Declarations

Conflict of interest/Competing interests :The author declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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