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Water reflections on the social dimension of place: Different waterscapes and related activity patterns

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Abstract: In this study, we determine the effects of different waterscapes on human psychology and how they influence the human activities in the surrounding environment. Based on this understanding, we underline some guiding principles to be used in designing more effective waterscapes, that better satisfy psychological necessities of people (such as social interaction, positive identity, spiritual prosperity) and better support the human activities taking place in the surrounding environment. Psychological effects of different waterscapes (such as energy boosting, exhilarating, tranquillizing, comforting) and their relationship with the activity context of the surrounding environment is investigated by means of visual questionnaires put together using video records. The resulting data from the questionnaires is analyzed to understand the roles played by still and active water components in characterizing the psychological effects of a waterscape and its influence on the surrounding activities. It is found out that different waterscapes have substantially different psychological effects on people and the effectiveness of a waterscape is highly dependent on the activity context of the surrounding environment. Capitalizing on these results, some important design principles that are deemed effective in designing waterscapes are presented.
Keywords: Waterscapes, Psychological needs, Waterscape-Activity relationship

Suyun mekanın sosyal boyutu üstüne yansımaları: Farklı su öğeleri ve ilişkili oldukları etkinlikler

Özet: Bu çalışmada farklı su öğelerinin insan psikolojisi üzerindeki etkileri ve bulundukları mekanlardaki insan etkinliklerini nasıl etkiledikleri belirlenmiştir. Bu görüş doğrultusunda insanların psikolojik ihtiyaçlarını (sosyal etkileşim, olumlu kimlik, psikolojik refah gibi) daha iyi karşılayan ve o çevre içinde yer alan insan etkinliklerini daha iyi destekleyen, daha etkin su öğelerinin tasarımında kullanılabilecek bazı ilkelerin üzerinde durulmuştur. Farklı su öğelerinin psikolojik etkileri (enerji, hareket, coşku, sakinlik, rahatlama gibi) ve mekansal etkinliklerle ilişkileri kamera görüntülerinin kullanıldığı görsel anket çalışmasıyla saptanmıştır. Hareketli ve durgun su öğelerinin psikolojik etkileri ve çevrelerindeki etkinliklerin gerçekleşmesi üzerinde oynadıkları rolü anlamak için anketten elde edilen veriler analiz edilmiştir. Farklı su öğelerinin insanlar üzerinde farklı psikolojik etkileri olduğu ve su öğelerinin etkisinin içinde bulunduğu mekanın etkinliklerine büyük oranda bağlı olduğu bulunmuştur. Bu sonuçlardan yola çıkarak su elemanlarının tasarımında etkin olabilecek bazı önemli tasarım ilkeleri sunulmuştur.
Anahtar kelimeler: Su öğeleri, Psikolojik ihtiyaçlar, Su-Etkinlik İlişkisi

1. Introduction

In open public spaces, water has great value for environmental designers, psychologists, sociologists, and people in general due to its aesthetic value, sensory encouragement, social function, and psychological benefits (Huang, 1998). Many studies have shown that water positively affects environmental preferences. (Ulrich and Simons, 1986; Schroeder, 1987). Nasar (1987) has shown in his studies that water increases visual satisfaction. It has also been pointed out by Sorvig (1991) that flow of water may not only make people feel good, but also calm them down, keep them away from boring thoughts, and entertain them.

Ward and Russell (1981) have put forward in their studies that spaces harbor psychological or sensory feelings within them. And psychologists have put forward that people need new surroundings and different motives from time to time. As a result, spaces featuring water elements can answer the psychological needs of people (such as relaxing, reducing stress, harmonizing with the nature, socializing, and having fun) living in cities and feeling tired of the sometimes hectic rhythm of everyday work life (Huang, 1998).

In summary, open spaces featuring water elements are preferred by both designers and users. The existence of water in a landscape design is highly important because of its aesthetic contribution to the environment, its social value to the users, and its shortage in open spaces within cities. However, designing open spaces with water elements is a challenging task. A good design should meet aesthetic satisfaction and user needs simultaneously (Huang, 1998). But when existing waterscape designs are studied, it can be seen that water elements are used solely to create variety without taking into account the specific properties of the space in consideration, such as its formation or the activities it encompasses. The use of water elements to increase the preference of a space without paying special attention to its sensory dimensions as well as the type of activity taking place in its surrounding environment is a highly questionable design choice. There are some crucial questions to be answered before making a choice as to what

types of water elements are to be included in a design. For instance, are there suitable designs that mix together a plethora of water elements, such as various forms of still and flowing water, in a single open space? Or is there an ideal form of water which positively influences all different aspects of an open space, such as the activity context of the space and its sensory dimensions, making the use of a single uniform water element sufficient in a design. Does the acceptance of a water element in an open space depend upon the activities being performed in its surrounding environment? Although it is not hard to guess that this is the case, determining how the properties of an open space affect the choice and composition of the water elements to be used in a waterscape design constitutes a major challenge.

The feelings water associates within people's minds, and whether or not these associations are related to the activities being performed in the surrounding environment, are points often overlooked while designing waterscapes. For this reason, unusable and futile designs are usually occurring, which leads to both the consumption of public resources and the failure to satisfy human needs.

1.1. Previous research on preference of waterscapes

Many researchers studying in the field of environmental psychology, such as Nasar (1987), Ulrich and Simons (1986), Brown and Daniel (1991), Yang and Brown (1992), Herzog (1985), and Bachelard (1983), have studied people's preferences of water in natural and artificial environments. It has been strongly established in this line of research that people prefer spaces containing water (Yang and Brown, 1992), and there have been various studies (Herzog 1985, Ulrich and Simons 1986, Nasar 1987) aimed at understanding how people perceive the existence of water in a landscape, and how they are affected from various forms of water in an environment.

Existence of certain types of water elements in an environment plays an important role in defining whether a place is preferred for a given type of human activity or not. This is mainly due to different effects of these water elements on human perception and psychology. In order to create effective designs, it is necessary to understand the relationship between the existence of water elements in a space and the activity context of the space, as well as its physical features.

There are various studies made in this context. For instance, Huang (1998) has investigated people's preferences for waterscapes using psychophysical paradigms. In conclusion, it was supported that preferences of waterscapes in built environments are affected from physical features and psychological attributes of the scenery. In addition, Huang found that the most preferred waterscapes are the ones that encourage lively activities, whereas the least preferred waterscapes are the ones around which passive activities are performed. Since the aim of our study is to understand the relationship between the existence of various types of water elements in waterscapes and their effects on people's psychology as well as people's preferences of the space in relation to the activities occurring in the surrounding environment, it is important for us to research which qualities of water are preferred and why, how these preferences are made, and whether or not these preferences have any relationship to the activities people perform, and if yes, what are the underlying principles governing these relationships. For example, can we say that still water is preferred in places of rest because it associates with peace and calmness?

Yang and Brown (1992) found that the existence of water in the landscape plays a powerful role in enhancing the preference regardless of cultural differences. Herzog (1985) has discovered that different forms of water existence have different effects on the preference of a landscape.

Kaplan (1984) has put forward that people take comfort from knowing that water is a resource in their reach, and water elements in their surrounding environment are reminders of this fact which brings further satisfaction. Campell and Moore (2002) have put forward that coherent and mysterious waterscapes are the most preferred. Purcell (1987) has also expressed that water has a curial role in environmental experiences. In an urban park study performed by Danielle (1992) has been observed that the existence of water elements had increased the preference. In the study of Kaltenborn and Bjorke (2002) on environmental preferences, water has come into view as the most attractive environmental element. In another study conducted by Herzog and Bosley (1992), large bodies of water received high preference with regard to tranquillity, but flowing waters were found out to be the most preferred type of water elements overall. Bachelard (1983) has expressed that water has many complex properties, that it is a softener, separator, and combiner, and that these properties attract people's interest.

In summary, when all these studies are examined, it comes to light that water is an important element in landscape design, existence of which considerably increases the environmental preferences of people. But the element of water should harmonize with the physical features of the space and the activities taking place in the surrounding environment. It should also meet the physical and psychological needs of people associated with their activities.

Although these studies researched the effects of water element usage in landscape design on the preference of designed spaces, none of them has completely determined the various psychological and sensory effects water creates on the users in different activity contexts. In particular, previous studies have not tackled the problem of determining which types of water elements are suitable for which activities. However, a successful waterscape design requires knowledge of user preferences with regard to water elements, as well as how these preferences relate with the features of a space and its activity context. In order to bridge this gap in knowledge and improve the state of the art in waterscape design, this study makes the following two important contributions:

- A careful and detailed characterization of the psychological effects of various water elements used in landscape design.
- A formulation of the suitability of different water elements in a waterscape design, based on the types of activities performed in the surrounding environment.

1.2. Classification of water elements

In this study we classify water elements into two broad categories, namely still and active water elements, and into several subcategories, so as to be able to use and reason about water correctly in landscape design. This classification is constructed in view of the previous work in this area (Sorvig, 1991, Şentürk, 1990).

Still (motionless) water elements are the ones that conform to the shape and structure of the place they are in due to the effect of gravitation, and are static in nature (Sorvig, 1991).

Active waters are important elements of design due to their acoustic and visual effects (Şentürk, 1990). Waters in motion help suppress the nerve-wracking sounds of crowded urban life, and thus create a more peaceful atmosphere. They attract people's attention to a certain point (Chanson, 1998, Litton, 1984).

1.3. Activities in open spaces

Designers' duty is to create suitable spaces for people to perform their activities. These spaces should provide physiological and psychological conditions required to perform these activities in a more comfortable fashion.

Open spaces are healing places for the soul and the body where people can keep away from absent-mindedness and stress. Being in an inner city open space also reflects the need for "getting away" and "escaping''. According to Carr et al. (1992), the most important reason why open spaces attract people is that they reflect the nature.

According to Heath (1988), preference of open spaces increases due to many reasons besides aesthetics. A designed space should be supplemented with activities.

A study has shown that the majority of the users spent their time in open space parks watching and observing other people (Project for public spaces, Inc., 1979). Carr and Lynch (1981) have put forward that preference of open spaces depends upon whether individuals or groups of individuals can express themselves in that area and escape from their routine works and family problems.

Whyte (1980) argues that some stimulants in open spaces arouse an interest in people to talk to each other and establish relationships. Crowhurst and Lennard (1987) have put forward that objects such as fountains increase interaction in urban open spaces. Lively activities in open spaces (like games, sports, and social activities) improve the level of entertainment by increasing pleasure and joy, which is much needed in urban life. It is wondered what sorts of water elements are necessary for the design of open spaces where lively activities are performed, which must be known to be able to create livable spaces.

The passive activities are related to the sense of relaxation. These activities provide involvement in a situation without active participation. According to Whyte (1980), watching people is the most popular passive activity in open spaces found in city centers. Another popular passive activity is paying attention to the physical and esthetic features of the environment. People consider spaces featuring aesthetic design elements such as water, to be attractive (Huang, 1998). Lynch (1960) puts forward that people's interest in making discoveries in open spaces needs stimulants and water is one of the stimulants creating perceptive differences.

2. Method

This study is aimed at determining the types of water elements preferred by people and for what reasons; whether or not this preference bears any relationship to the activities people engage in open spaces; and if it does, what activity relationship it establishes. And the main method used in this study is visual questionnaire.

The visual questionnaire method we employ is practical, but comes at the cost of losing some level of expressiveness. In particular, the three dimensional sound and image of the waterscape and the atmospheric properties of the surrounding environment (such as temperature, humidity, and air quality), which form a major part of the experience that defines "being" in a place, are lost. However, we believe that the scalability of the visual questionnaire method to a large number of participants is a big advantage in deriving generalizations from our results, which far exceed the disadvantages.

According to Daniel and Ittelson (1981), spaces or parts of spaces presented to the participants using visual symbols must be faithful to their originals. Hetherington (1991) believes that symbols serve in place of the environment, but they are perceived differently, and for this reason the symbols should capture only the parts of the environment that are important for the objective of the study. Truthfulness of a visual expression depends on the degree to which it reflects the described environment. Even though photographs and slides are usually used as environmental symbols for perceptive assessments, they do not have situational variety containing dynamic environmental conditions such as motion, sound, etc. Brown and Daniel (1991) have found out systematic differences between static and dynamic expressions. They have expressed that static symbols such as slides and photographs cannot adequately show dynamic environmental features such as the flow of a river, etc., whereas dynamic symbols such as video clips can better illustrate the details of a water flow. Research by Hetherington, Daniel et al. Brown (1993) has made it clear that sound and motion affect the preference of a scenery. Therefore, in this study the samples were presented with video recordings that capture the properties used in "symbolic description" of the chosen water elements.

Whyte (1980) has put forward in a research he has conducted on inner city open spaces that these spaces are used most commonly under the sunny and partly sunny conditions (except the extremely hot summer days). In consideration of this result, camera records have been made on sunny days. Time lengths of the camera recordings must be short, so as not to make the subjects feel bored, but long enough to make a satisfactory assessment. For these reasons, in this study camera recordings were also made for three minutes each.

The visual questionnaire is performed as a form of investigation. The subjects have been shown each video clip for three minutes within the timeframe of the questionnaire were asked to list i) the words they associate with the water elements seen in the video, ii) the ideas that come to their minds while watching the video, and iii) the activities they consider to be good fit for the environment depicted in the video. Close-ended questions tend to limit expressiveness and oblige people to give guided answers. Some people may not be able to completely express their ideas in their answers, because the choices may not include all the

alternatives. It is also likely that some choices may have escaped the researcher's attention.

Study area

Eight areas containing different types of water elements have been determined in Trabzon province of Turkey in connection with this study. Fourteen different kinds of waterscapes have been chosen in these areas, enabling us to capture a rich variety of active and still water elements, such as rivers, waterfalls, fountains (active), seaside, lakes, and pools (still). Some areas incorporate multiple waterscapes, active and still. The fourteen waterscapes are presented in Figure 1 through Figure 14 and correspond to the video clips shown to the questionnaire takers. The eight areas and the fourteen waterscapes they encompass are:

1) Akçaabat Park, facing the scenery of the Black Sea, contains various waterscapes; a fountain (Figure 1), a seaside (Figure 5), and a pool with fountains (Figure 6).

2) Meydan Park, situated in an easily accessible place in the Trabzon city centre, contains a pool with a centrally located fountain (Figure 2).

3) Altındere National Park, one of the most important tourist attractions of the city, contains several natural waterfalls (Figure 3, Figure 10, Figure 11).

4) Suburb of Çömlekçi, a high traffic region of the city of Trabzon, contains a fountain in the centre of the main street (Figure 4).

5) Ganita Park, a popular park among the city youth, is facing Akçaabat seaside (Figure 7).

6) District of Sotka, contains an artificial waterfall situated in its vicinity (Figure 8).

7) Lake Sera, a popular recreational area, is a landslide lake (Figure 9).

8) Lake Uzungöl, a major tourist attraction and a popular recreational area, is located in a valley between high rising mountains (Figure 11), includes a natural waterfall (Figure 13), and a river (Figure 14).

Figure 1. A fountain in Akçaabat Park

Figure 2. A fountain in Meydan Park

Figure 3. A natural waterfall in Altındere National Park

Figure 4. A fountain situated in the center of the state road in Çömlekçi

Figure 5. Seaside of Akçaabat

Figure 6. A pool with fountains in Park of Akçaabat

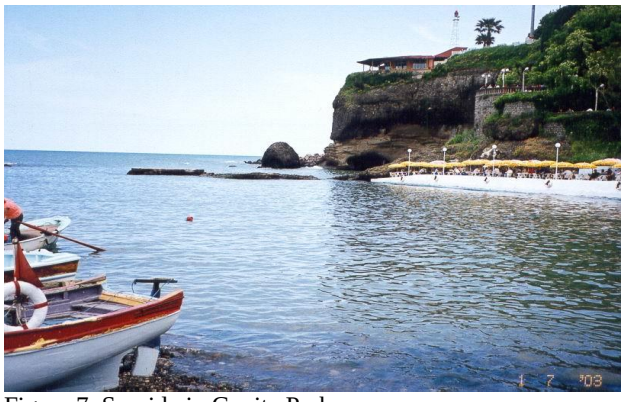

Figure 7. Seaside in Ganita Park

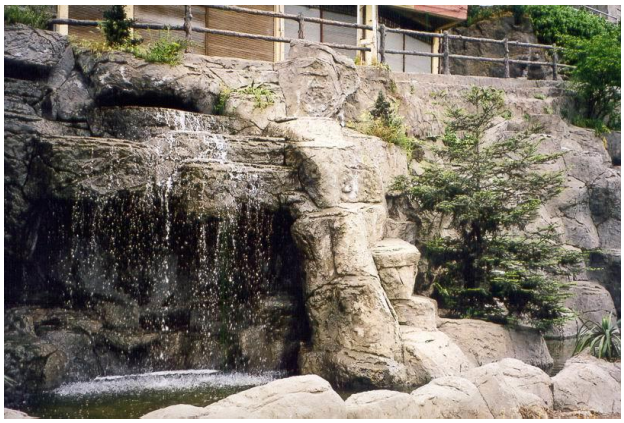

Figure 8. An artificial waterfall situated in the vicinity of Sotka

Figure 9. Lake Sera

Figure 10. A natural waterfall in Altındere National Park

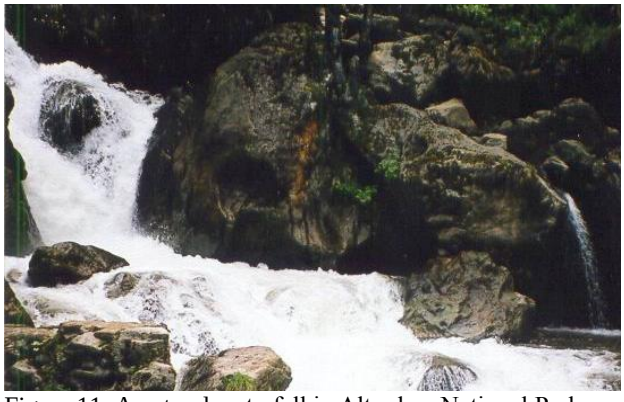

Figure 11. A natural waterfall in Altındere National Park

Figure 12. Lake Uzungöl

Figure 13. A natural waterfall in Uzungöl

Figure 14. A river in Uzungöl

Choosing the samples

A sample set of 260 people is used in this study as a representative subset of the population. In the rest of this paper, we derive our results based on the analysis performed on the questionnaire input provided by this population and make appropriate generalizations. The demographics of the selected population are given in (Table 1. Demographic structure of the participants of the study were not asked whether they have visited the places shown to them in the video recordings (Table 1. Demographic structure of the sample population).

3. Results

Determination and classification of attribute associations and activity preferences

Since our aim is to study the attributes associated with water elements and activities preferred within their surrounding environment, the user responses on attribute associations and activity preferences are first classified in Table 2 according to being active or passive to make it easier to reason in the context of still and active water elements.

Findings concerning the video clips

For each video clip, the attributes associated with the scenery and the activities preferred in the pictured environment are collected from the participants of the questionnaire and the occurrence percentages of attributes and activities are calculated. These results are listed in Table 3 and Table 4. The attributes or activities with an occurrence percentage of less than 10% are discarded and are not reported.

We make the following observations from the Table 3 and Table 4.

In the 1st video clip, “noisy” attribute and “playing sports” activity have the highest percentages among other attributes and activities, respectively in attribute associations and activity preferences sections. In the 2nd, 3rd and 10th video clips, “enthusiastic” attribute and “playing sports” activity have the highest percentages. In the 4th video clip, “noisy” attribute and “walking” activity have the highest percentages. In the 5th, 7th, 8th, 9th, and 12th video clips, “tranquil” attribute and “contemplation” activity have the highest percentages. In the 11th video clip, “enthusiasm” attribute and “walking” activity have the highest percentages. In the 13th video clip, “enthusiasm” attribute and “contemplation” activity have the highest percentages. And finally, in the 14th video clip, “tranquility” attribute and “walking” activity have the highest percentages.

Table 1. Demographic structure of the sample population

Demographic variables	Number	Percentage (%), *n* = 100
Gender		
female	148	52.8
male	132	47.1
Age (years)		
15-20	65	23.2
20-25	74	26.4
25-30	76	27.1
30-35	38	13.6
over 35	27	9.7
Education		
uneducated	-	-
primary school	2	0.7
secondary school	-	-
high school	117	41.8
university	161	57.5
Occupation		
student	117	41.8
worker	149	53.2
retired	1	0.4
self-employed	6	2.1
other	7	2.5

Table 2. Classification of the attributes and activities obtained from the user data

Attribute Associations		Activity Preferences	
Attributes About Action	Noisy Energetic Enthusiastic Dynamic Free Magnificent Powerful Surprising Interesting	Lively Activities	Walking Strolling Playing Games Playing Sports Dancing Picnicking Cycling
Neutral Attributes	Happy Pleasant Disturbing Boring	Passive Activities	Sitting Eating Talking Relaxing Reading Contemplation Listening Music Amusing Sleeping
Attributes About Stillness	Tranquil Relaxed Spacious Cool Monotone Quiet Calm		

Table 3. Attributes associated with the scenery (%)

Attribute Associations	14 WATERSCAPE SCENES													
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th	13th	14th
Noisy	59	13	-	58	-	-	-	-	-	-	-	-	-	-
Energetic	57	10	61	22	-	48	-	-	-	62	52	-	49	-
Enthusiastic	51	48	69	-	-	58	-	-	-	75	62	-	54	-
Dynamic	14	28	16	51	-	32	-	-	-	49	26	-	12	-
Free	10	-	-	-	-	-	-	-	-	-	-	-	-	-
Magnificent	-	-	-	-	-	52	-	-	-	-	-	-	42	-
Powerful	10	-	10	22	-	-	-	-	-	18	12	-	15	-
Surprising	-	-	12	-	-	-	-	-	-	32	53	-	-	-
Interesting	-	-	-	-	-	18	-	-	-	12	-	-	-	-
Happy	10	45	50	-	-	38	52	15	18	-	-	12	-	-

Table 4. Activities preferred in the pictured environment (%)

Activity Preferences	14 WATERSCAPE SCENES													
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th	13th	14th
Walking	-	22	20	61	43	17	-	-	-	30	51	59	-	46
Strolling	-	-	10	-	23	12	33	42	30	-	-	-	-	80
Playing Games	33	32	-	-	-	43	13	-	-	43	43	-	-	-
Playing Sports	41	42	62	-	-	26	-	-	-	58	50	-	40	-
Dancing	39	38	-	-	-	39	-	-	-	38	-	-	-	-
Picnicking	-	-	32	-	-	-	-	-	26	-	12	59	13	11
Cycling	-	-	-	-	12	-	-	-	-	-	-	-	-	22
Sitting	-	30	13	-	63	34	51	55	15	-	-	17	38	11
Eating	-	-	-	-	-	-	19	-	36	-	-	16	33	10
Talking	-	-	-	-	-	-	69	-	-	-	-	-	-	-
Relaxing	-	21	16	-	-	21	13	33	53	-	21	30	39	-
Reading	-	-	-	-	-	-	12	-	-	-	-	18	-	-
Contemplation	34	33	56	51	83	38	73	88	73	41	48	73	90	70
Listen to Music	-	-	-	-	16	-	13	-	-	-	-	15	-	-
Amusing	30	-	28	-	-	37	12	-	-	-	-	-	-	-
Sleeping	-	-	-	-	-	-	-	-	35	-	-	-	-	-

However, in many of the video clips there are more than one attribute or activity with high percentages and thus are statistically significant. In order to determine the set of significant attribute associations for each video clip, we have grouped them into three clusters, namely "significant", "of moderate importance", and "insignificant" attribute associations. For video clips that have 5 or less number of attribute associations, we only used two groups, "significant" and "insignificant". The same technique is applied to activity preferences. The clustering is performed using the k-means method (Han and Kamber, 2000), which minimizes the total intra-cluster variance. The only exception we had in applying this method was determining the set of activity preferences for video clip 4, in which there are only two activities listed in Table 4. Activities preferred in the pictured environment (%).The set of "significant" attribute associations and activity preferences resulting from our analysis is given in Table 5.

Table 5. Significant attribute associations and activity preferences

Figure No.	Water elements within video clips	Classification of water elements	Attribute Association	Activity Preference
Figure 1	A fountain in Akçaabat Park	Active	Noisy, Energetic, Enthusiastic	Playing Sports, Dancing
Figure 2	A fountain in Meydan Park	Active	Enthusiastic, Happy	Playing Sports, Dancing
Figure 3	A natural waterfall in Altındere National Park	Active	Enthusiastic, Energetic, Happy	Playing Sports, Contemplation
Figure 4	A fountain in the center of the state road in Çömlekçi	Active	Noisy, Dynamic	Walking, Contemplation
Figure 5	Seaside of Akçaabat	Still	Tranquil, Spacious, Calm, Relaxed	Contemplation, Sitting
Figure 6	A pool with fountains in Akçaabat Park	Active	Enthusiastic, Magnificent, Energetic	Playing Games, Dancing, Contemplation, Amusing, Sitting
Figure 7	Seaside in Ganita Park	Still	Tranquil, Happy, Relaxed	Contemplation, Talking
Figure 8	An artificial waterfall situated in the vicinity of Sotka	Slight motion	Tranquil, Relaxed, Quite	Contemplation
Figure 9	Lake Sera	Still	Tranquille	Contemplation, Relaxing
Figure 10	A natural waterfall in Altındere National Park	Active	Enthusiastic, Energetic	Playing Sports
Figure 11	A natural waterfall in Altındere National Park	Active	Enthusiastic, Surprising, Energetic	Walking, Playing Sports, Contemplation, Playing Games
Figure 12	Lake Uzungöl	Still	Tranquil	Contemplation, Walking, Picnicking
Figure 13	A natural waterfall in Uzungöl	Active	Enthusiastic, Energetic, Spacious, Magnificent	Contemplation
Figure 14	A river in Uzungöl	Slight motion	Tranquil	Strolling, Contemplation

4. Discussion

Designed spaces should be able to meet human needs in order to be effective, both from comfort and functionality point of view. In order to avoid designs that are incapable of materializing spaces that can meet user demands and requirements, designers should not overlook people's psychological and physiological needs while designing spaces. Therefore, it is absolutely necessary and utmost important to learn how people are affected by their surrounding space, as well as to understand the role played by individual space components in a design's psychological and physiological impact on people.

The study presented in this paper is aimed to discover the fundamental waterscape design principles concerning the integration of i) the psychological effects created by different types of water elements on people and ii) the interplay of these effects with the activity context of the space, into the design process. We study the emotional associations people make with the existence of different types of moving and still water elements in open spaces, and the influence of these associations on the activities preferred by people in these spaces. In this conducted study, it has been discovered that different types of water elements cause people to make different emotional associations and more importantly through these associations different types of water elements have a differing effect on the preference of a space, which is based on the compatibility of the stimulated emotions with the activity context of the space in consideration.

It has been determined that the elements of still water associate with the emotion of peace, and that the elements of moving water associate with the emotions of enthusiasm, energy, excitement, etc. Moreover, it is found that the elements of still water are more compatible with passive activities and that the elements of moving water are more compatible with lively activities. In what follows, we list our detailed results derived from the analysis of the percentages generated using the data obtained from the questionnaires.

The results show that,

- Different elements of water cause people to make different emotional associations;
- "Tranquil" attribute has the highest occurrence percentage in the video clips numbered 5, 7, 9 and 12, where scenes with still water elements are depicted; and in the video clips numbered 8 and 14, in which the water shows slight motion;
- Attributes often tied with high activity ("noisy", "energetic", "enthusiastic", "dynamic", "magnificent", and "powerful") got the highest percentages in the video clips numbered 1, 2, 3, 4, 6, 10, 11 and 13, where scenes with active water elements are depicted;
- Among the video clips depicting waterscapes in which the water is spouting downward from above, "noisy" attribute got the highest percentage in the video clips numbered 1 and 4, in which ponds with a single fountain are pictured; whereas the attribute "enthusiastic" got the highest percentage in the video clips numbered 2 and 6, in which ponds with multiple fountains are pictured;
- "Enthusiastic" attribute got the highest percentage in the video clips numbered 3, 10, 11 and 13, that are depicting waterscapes with flowing and falling water elements;
- According to the obtained percentages, different activities are preferred in the spaces containing different waterscapes;
- Passive activities of "watching", "sitting", "talking", and "relaxing" got high percentages in the video clips numbered 5, 7, 9 and 12, which are depicting waterscapes with still water elements, as well as in the video clips numbered 8 and 14, in which the water is in a very slight motion;

- "Contemplation" activity got the highest percentage in the video clips numbered 5, 7, 9 and 12, that are depicting waterscapes with still water elements, as well as in the video clips numbered 8 and 14, in which the water is in a very slight motion;
- "Playing sports", "walking", "playing games", and "dancing" activities got high percentages in the video clips numbered 1, 2, 3, 4, 6, 10 and 13, which are depicting waterscapes with moving water elements;
- In video clips containing ponds with a single fountain (which form a subset of the video clips depicting waterscapes in which water is running downward from above), "playing sports" activity got the highest percentage in the video clip numbered 1 and "walking'' activity in the video clip numbered 4, whereas in video clips depicting waterscapes with multiple fountains, "playing games" activity got the highest percentage (in the video clip numbered 2 and 6);
- In video clips numbered 3, 10, 11 and 13, which contain elements of water moving downward from above, "playing sports" got the highest percentage with the exception of video clip numbered 13, in which "watching" activity got the highest percentage.

5. Conclusion

This study shows that different water elements in a waterscape design have different psychological effects on people and that the activities performed in a space is likely to change according to the type of water elements incorporated in the waterscape design. Therefore, waterscape designs that do not take into consideration people's preferences and psychological needs result in ineffective spaces that are not supportive of the user activities planned to be performed in the surrounding area. Losses in terms of time, labor, and money are inevitable consequences of such flawed designs.

In summary, psychological effects of water elements on people and the relation of these effects with the activity context of the surrounding environment predominantly define functional and emotional dimensions of the space, and is a major factor in determining people's acceptance of a designed space. Based on our understanding of the psychological effects of water elements on people and their relation with the activity context of the environment, which is derived from our detailed analysis of user input from open-ended visual questionnaires, we list a set of suggestions concerning the usage of water elements in waterscape design and activity planning in the surrounding environment:

- The design should meet people's needs in the best way possible. For this reason, it is necessary that the psychological effects of the space components as well as the user preferences should be known and be available to the designers. The psychological dimension of the space should not be overlooked during the design process.
- The parks which are not used or are underused (especially in Turkey and in the city of Trabzon) cause not only economic loss but also losses of labor and time. When errors and misjudgments are made in the design of economically expensive waterscapes, it often becomes very difficult to redesign or correct them. So as to be able to overcome this problem, it is necessary that psychological effects of different water elements on people and their relationship with the activity context of the surrounding environment is known at the stage of planning. This will make it possible to create sound and beautiful designs that result in usable and livable spaces.
- This study provides important clues for designing waterscapes by studying the emotions people associate with different types of water elements and the activities people prefer in environments that incorporate different types of water elements. It is found that:
  - Spaces designed for passive activities should incorporate still water elements, in consideration of the tranquil nature of still water.
  - Spaces designed for lively activities should incorporate moving water elements, in consideration of the energetic, noisy, and powerful nature of moving water.
- Many of the waterscapes used in this study are not artificial designs, but are natural ones. Consequently, when activities are designed for these waterscapes, the suitability of the space for the activities in mind should be assessed. This assessment should be based on the compatibility of the emotions associated with the water elements that form the waterscape and the attributes of the planned activity.

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