
RESIDENTS' PERCEPTIONS OF RIVERINE LANDSCAPE CHANGES; CASE STUDY OF BEYKOZ STREAM/ İSTANBUL

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ABSTRACT

Residents are an inevitable part of the urban projects. Thus, knowing about their perceptions and preferences is a key factor in conducting any changes in the urban environment. This issue is of greater importance in urban river enhancement projects, as the rivers are associated with various economic, cultural, and social issues of the residents. The main goal of the present research is to assess the riverine landscape of Beykoz in İstanbul after bearing tremendous changes. The riverine landscape is surveyed considering the natural features, physical elements, and the people's perception in particular. The main part is based on the interview with the local residents to achieve their comments about the stream changes and their ecological and cultural memories attached to the site. The results indicate that there is valuable information in residents' perceptions about natural corridors like the streams that should be evaluated before any restorative or enhancement operations. Changing the stream channel and its bank with no care of the residents' dimension will disturb the place identity, sense of belongingness, and the unique meanings associated with the urban rivers. Visual access to the stream, the stream's natural landscape with native vegetation, its biodiversity, its sound, and color are the factors that should be maintained during the urban river projects.

Keywords: Riverine landscape, Resident's preference, Perception, Evaluation

1. INTRODUCTION

Riverine landscapes in the cities are changing by human activities under a series urban development projects and restorative operations. They have also been affected by the natural and ecological processes like climate changes, natural disasters, and seasonally increased runoff [1, 2]. In fact, natural corridors including rivers or streams in the cities are associated with changes and disturbances due to various purposes. For example, rivers occurred in the city may interfere with the citizen-oriented constructions and urban development programs. The natural structure of the streams may cause some troubles to the residents; such as water penetration into buildings surrounded the stream, seasonal flooding in the city due to increasing unusual precipitation. Thus, it is inevitable to conduct some interventions to upgrade the current status of the urban riverine landscapes.

Efforts to enhance or change the rivers are concerned with the social and cultural implication of the changes in the landscape [3]. There is a particular concern about ignoring cultural and social attributes of the river environments through enhancement projects of the rivers in the city [4].

The ecological approaches in river restoration may not meet the resident's preferences and their expectations. Even though most people tend to prefer natural landscape over built- environment landscape [5, 6], in most cases, people's preferences and perceptions are different. Especially about the riverine landscapes in the cities, people might have various expectations from the urban streams.

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Hence, it has been suggested to evaluate urban river changes by regarding the residents' perceptions of where the people's experiences and their cultural and social memories attached to the landscape.

The relationship between people and landscape is a complicated issue, as it deals with both natural and cultural processes. The issue in which group's preferences should be in priority in landscape projects has remained contentious. Peoples' perceptions of landscape changes of urban rivers can differ substantially among academic, local resident, and practitioner [7]. In addition, resident's attitudes are shaped by a range of factors including age, social, cultural, and economic status, ethnic origin, and familiarity of place and environmental values [8] which should be regarded in evaluation before and after any urban landscape projects including river landscape changes.

The perception-based approach in landscape change assessment is a subjective approach which is basically different from the expert-based approach [9]. The expert-based approach stresses viewing the environment through its intrinsic attribute of the physical and biological qualities, while the perception-based approach emphasizes the human view of the landscape [10] and involves with the interpretation of one's perception based on his background and associated experiences [11]. Some researchers believe that assessing the quality of landscape should be a subjective task [12, 6]. However, some experts stress that methods for landscape assessment should be based on the combination of both subjective and objective paradigms.

Place identity plays an important role in the positive or negative perception of environmental changes [13] and is defined by the individual's personal identity in relation to the physical environment by means of a complex pattern of conscious and unconscious values, beliefs, feelings, preferences, goals, behavioral tendencies [14, 15]. Similarly, ignoring the public's implication in enhancement programs of rivers may lead to disgraceful outcomes especially in riverine landscape. Engaging members of the public in decisions process of the river's restoration program can increase the sense of place, ownership, and pride toward local river environments [16]. Residents' perception extracts meaning attached to the riverine landscapes that include physical elements in the scene, their spatial arrangement, and personal, cultural and training factors [17]. It also counteracts feelings of alienation by promoting the connection between people and restored riverine environments [4]. Ultimately, the public's participation in the urban project especially in river project increases the likelihood that restoration schemes will be implemented and supported [18, 19]. In this way, the rehabilitation, restoration, and enhancement process have the main role to increase the users' attachment and place identity.

Discovering people's perceptions, their feelings, goals, beliefs, values, and preferences are essential before making any advancements or changes over an urban river or stream. Involving human cultures in restoration efforts keeps these projects together. As a matter of fact, social component is at the root of many restoration projects like the Kissimmee River in Florida in which the basic impetus was from concerned citizens who remembered the river before the flood control measures which converted river path into a straight canal. In this case, societal objectives were clearly defined; the meandering backwaters were restored while continuing satisfactory flood control [20]. The Red Clover restoration in California is another community-initiated restoration project. It restored 30 hectares (ha) of meadow along Red Clover Creek that was impacted by intensive logging and agricultural practices. The project involved the community and made them aware them of the project's dependence on local ecosystem services. The restoration efforts also reduced the sediment load of the stream allowing the continuing function of a hydroelectric power plant downstream [21].

In Turkey, in some studies, involving the people in restorative projects of the rivers has been taken attention from the researchers. One research has been performed in Ankara (2007) on Ankara River (Ankara Çay) that shows the importance of the river as a source of water and beauty and also how Ankara's rivers are getting affected by the urban development [22]. In that research, the people's

preferences of the river and its landscape are examined through some interviews. It is tried to prepare a conceptual plan which shows the residential, recreation, and the economic potential of the area according to the residents' preferences as well as the other services that the river and its green corridors can forward to the people. Another research is related to İzmir Rivers which flow from the city center to the sea. This study (2013) focuses on the Meles River to restore and enhance the valley. Meles River has been used for the fish catching as an economic source for the fish catcher. So, it emphasizes the contribution of both the fish catchers and responsive workers of the city municipality [23].

In this article, the riverine landscape before and after the implemented changes over the river landscape is evaluated. It also evaluates the residents' preferences and their satisfaction for the current condition of the river in the city. Looking for the cultural and ecological memories associated to the original river, this article focuses on the old resident's perceptions as they seem to have more familiarity with the local landscape of the area and have been the witness of the changes on the riverine landscape over time. Furthermore, this research hypothesizes that women and men may have various perceptions toward their local riverine landscape, so interviewers are separate in two groups of genders to catch their different viewpoints and preferences.

2. MATERIALS AND METHODS

Today, regarding the ecological planning approaches, the urban landscape is evaluated in terms of biophysical process besides its socio-economic intricacies. As to urban streams, there is a three-dimensional approach that considers three main types of evaluative viewpoints related to the River, the City, and the People. In this context, the river can be defined as the physical and biological world, the city can be viewed as the social and humanized world and the people can perform the place of individual emotions and perceptions [11] (Figure 1).

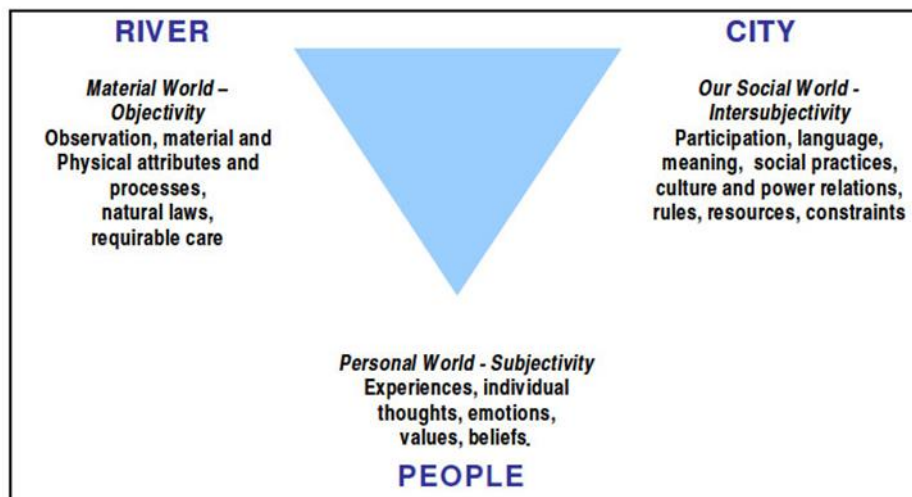


Figure 1. River, City, People Framework [13].

Considering these issues mentioned above, this study handles the riverine environment of the Beykoz Stream in İstanbul. In order to evaluate the implementations in this riverine environment, there is a need to assess the physical and ecological aspects of the site (city and river) before and after landscape changes as well as the people's dimension including the residents' perceptions, preferences for the changes, and their cultural - ecological memories related to the Beykoz Stream.

The first step is to determine and survey the natural and physical environment of the stream. Data used for assessing the stream's situation is achieved through historical documents, reports, aerial images, and field studies. It includes analyses of both ecological features of the stream and urban space adjacent to the stream. Photograph technique is used to examine the quality of the riverine landscape. Cleanness, accessibility, scenic beauty, cultural values, variety of activities, and land uses are considered as important parameters in the riverine environment analysis.

The second step is to achieve the residents' perceptions about the changes of the stream and their memories related to the site. It was interviewed by 22 persons (15males, 7 females) for 40 minutes in the site. They were chosen among the people sitting in a park adjacent to the stream. Elderly people were chosen to do an interview, as they were supposed to be asked about the stream changes over time. Old residents (more than 40 years of age) seem to have enough information about the past situation of the site and can evaluate the current changes better. To obtain the residences' perceptions of the stream, some specific questions were prepared. At first, the individuals were shown by the 5 photographs of the streams in the area to recognize how much the individuals belong to the site and whether they can recognize the Beykoz stream among the other streams in the area or not. We chose 5 pictures of the stream (two pictures taken from the Beykoz stream) to show them. The interview was continued with the ones who could recognize the Beykoz Stream by its pictures.

2.1. Site Description

Beykoz District is a region located in the northern end of the Bosphorus on the Anatolian side of İstanbul/Turkey (Figure 2). This district has been one of the most attractive, cultural areas in the İstanbul [24]. As well as being one of the most strategically important crossing points during history, the Bosphorus itself has always been famous for fish and opportunities for plundering the richer communities around the Marmara. Therefore, Beykoz district has been settled by a wave of invaders from the Black Sea [25]. Besides its strategic value, the industry was started in Beykoz, which began as small workshops in the 17th century and then a glassware factory known as 'Beykoz-ware' was established by the 18th and 19th centuries. A well-known shoe factory was later built, and both glass and shoe factories are closed now [26].



Figure 2. Location of the Beykoz in the İstanbul

Beykoz District has always suffered from uncontrolled development covering with illegal housing, where migrants were coming to live and work in the glass and other industries there [24]. Due to this incoming industrial workforce, Beykoz has had a working-class character besides the luxury of the

Bosphorus waterfront [25]. This green countryside of İstanbul which has been settled with little villages are urbanizing recently.

Beykoz district has five rivers as Riva, Küçüksu, and Göksu fed by the streams from Alem Mountain, Çubuklu, and Beykoz. The largest amount of water flows through Riva and the least one comes from Çubuklu (Figure 3). This place is defined as one of the most pleasant and peaceful districts of İstanbul, with much greenery still intact in the İstanbul [26; 27].



Figure 3. The streams flowing in the Beykoz District, and the location of Beykoz Stream in the area

2.2. Assessment of the Beykoz Stream

The Beykoz stream starts from the mountains in the northern part of İstanbul, gathers all of the small streams flowing in the green jungles together, and finally links them to the Bosphorus Strait [24]. To evaluate the streaming landscape, this study focuses on three parts; first, natural features; second, urban quality; and finally, people perceptions are surveyed by interview.

- The River

The natural quality of the stream has been extremely changed over 50 years [27; 28]. Three historical aerial images have been found between 1946 and 1982. It was tried to figure out and interpret the alterations of the Beykoz Stream through the aerial images over time (Figure 4).

According to the aerial images, in 1949, the river was mostly natural with the unique morphology. However, some small constructions are detectable in southern part near the sea. In 1982, after around 35 years, extreme changes occurred around the river. Housing and construction in the riverside destroyed the nature and only some of the fields left intact, like the land where is Meadow Park in the southern part now (Beykoz Çayırı). Most of the changes happened around twelve years ago when the

mayor of the Beykoz District changed the bed stream into straightly concreted bed and made the flow deeper and narrower in order to eliminate the problem of seeping water into neighboring houses [26]. In this way, the original form and structure of the stream were changed by the region's mayor, which has disturbed the river nature and its landscape.

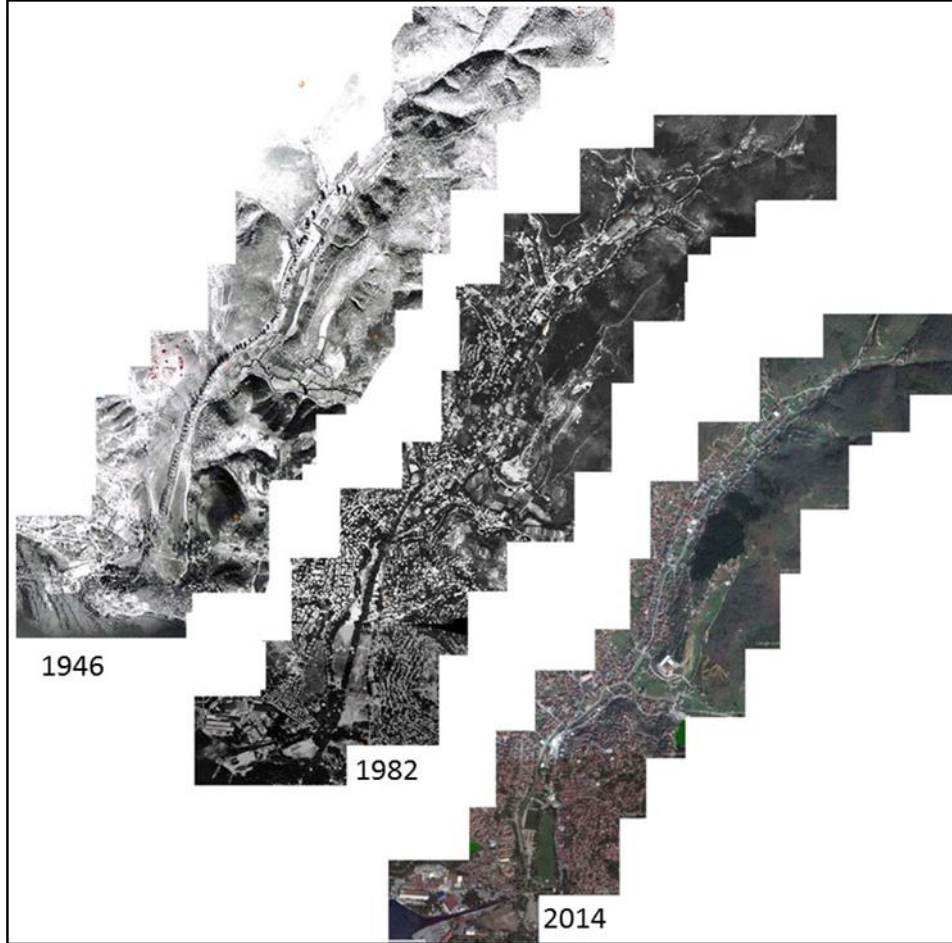


Figure 4. Comparison of the stream at three different time periods by the aerial images; Adapted from [29].

At present, what can be clearly felt across the stream is that the part of riverine landscape located in the city suffers from some issues such as displeased view, low amount of water, dirty and muddy water, huge concrete bed stream, weak biodiversity, uneven riverine vegetation, separation the stream of its surrounding, and soil erosion of the river bank in some parts. Figure 5 provides a visual map and illustrates various scenes across the stream. With moving toward the north across the stream, the stream landscape looks better and natural.

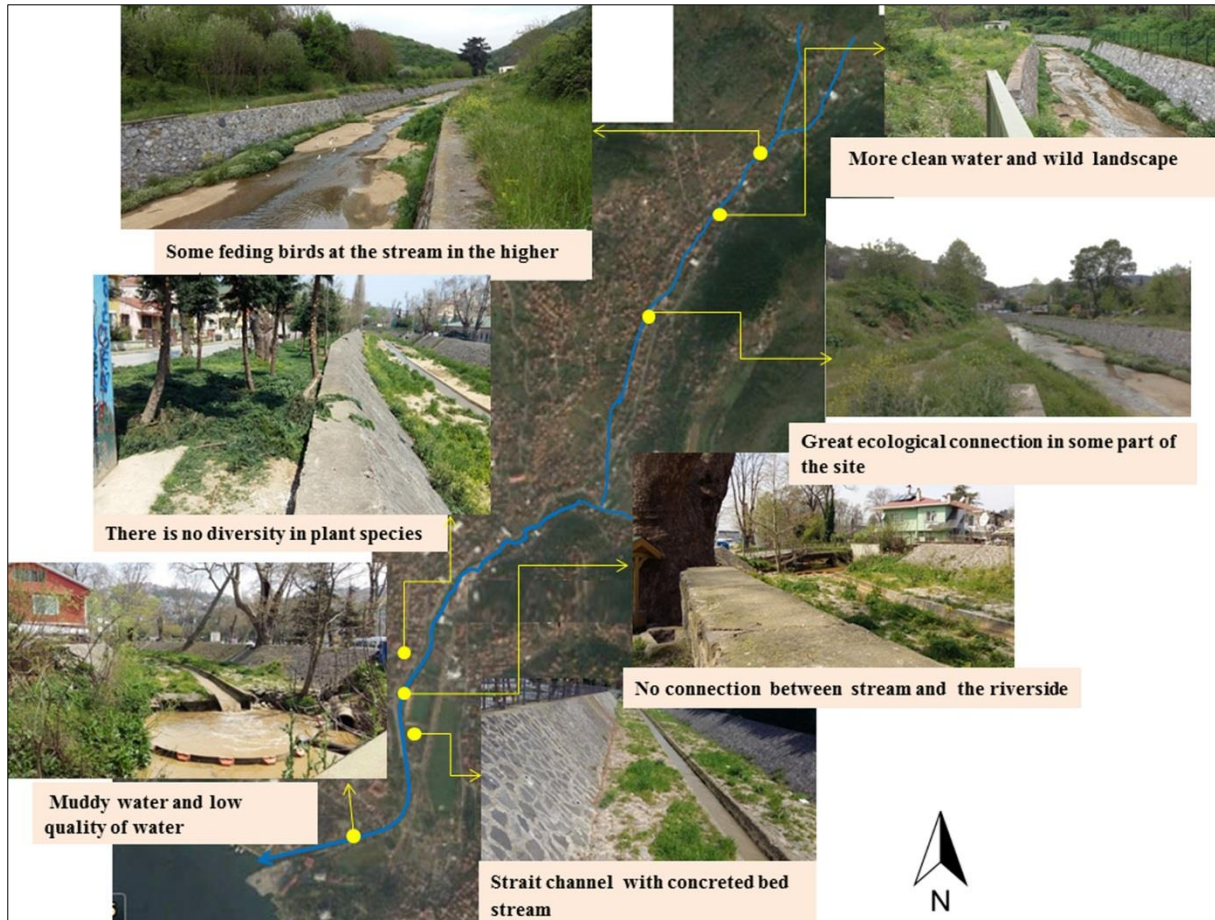


Figure 5. Evaluation of the natural structures of the stream; the natural elements of the riverine landscape includes its vegetative and planting structure, biodiversity, land and soil structure, water quality, and stream bed structure.

- The City

The main part of stream that passes through the city has interaction with its urban structures. The stream landscape in the residential area is extremely displeased. There isn't any access to the water; there are some derelict spots polluted by trash and inappropriate land uses like parking areas around the stream; there isn't any definite pathway along the stream to follow it, the view to the stream is closed by fencing. Figure 6 illustrates the urban environment of the stream by the pictures taken from the site.



Figure 6. Evaluation of the urban environment of the stream; urban environment includes the physical and man-made structures added to the natural landscape of the stream in result of urbanization.

The stream passes through a number of impressive landmarks and historical places that makes the role of it more pivotal. Beykoz castle, historical fountains, old shoe factory which is closed now, and the historical barrack are located across the stream (Figure 7).

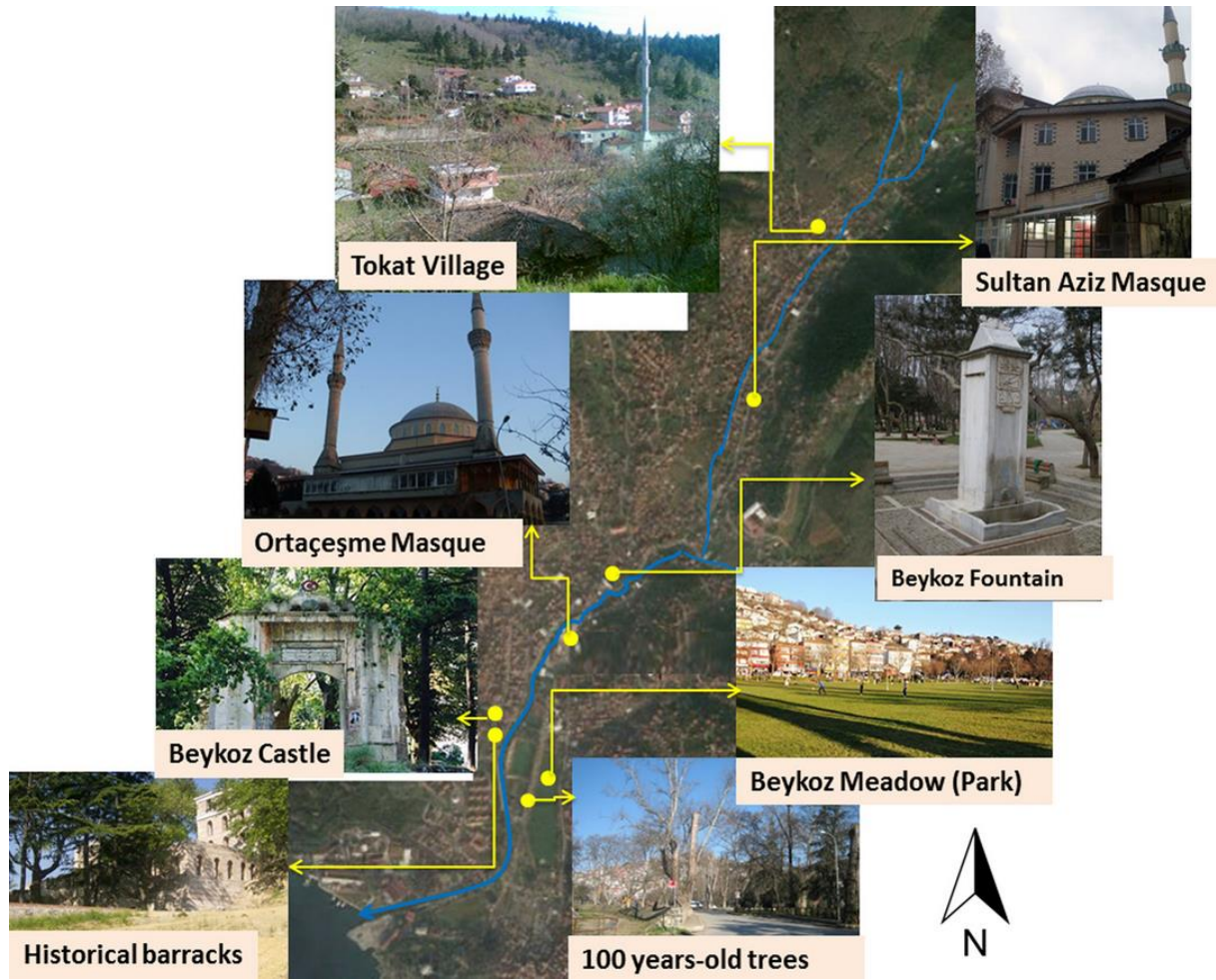


Figure 7. Clarification of the urban units and land uses along the stream; The stream is surrounded with historical landmarks and cultural heritages.

-The People

To obtain the residences' perceptions and their satisfaction of the riverine landscape and the stream enhancement, some specific questions were prepared and taken into consideration. In this way, it was decided to talk with local residents who were old enough to provide information about the past condition and history of the stream. The questions included five different sections. In the first part, people were asked to make points and criticize every feature of the current condition of the stream (both natural and physical elements related to the stream) and riverine landscape. In this part, the residents were also asked about the changes made on the bed stream by the municipality. At the second section, the residents were asked about the functions and activities located along the stream. The third part of the interview was about the individual expectations from the stream (both from its landscape and its function) and the valuable characteristics of the stream. They were asked about what they prefer to have related to the stream. For example, about the channel morphology of stream, they were asked to select their favorite form of the stream (Figure 8).

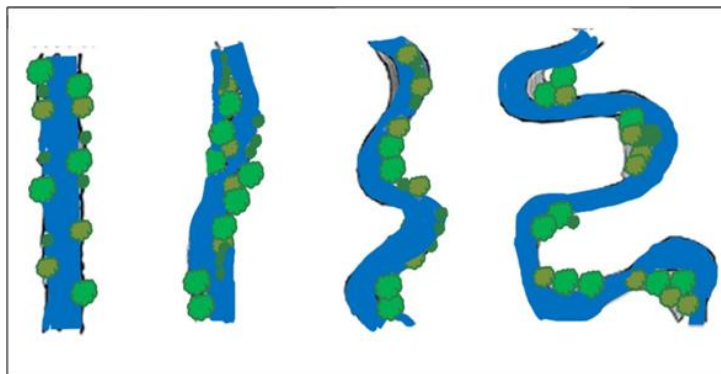


Figure 8. Various watercourse channels; according to the river classification by Brice (1983) [30], we defined four main stream forms observed readily on aerial photographs: straight, braided (network of interweaving channels, low sinuosity (gently curved), meandering (very curved, high sinuosity) respectively from the left.

Table 1. Summary of answers earned from the interviews by the residents in the area

Genders	Natural and physical elements	Function	Preferences	Social and ecological memories
Female (7 persons)	<ul style="list-style-type: none"> -Less amount of water -Not having visual access to see the water -low monitoring -Lack of vegetation and planting around the river -Lack of wildlife 	<ul style="list-style-type: none"> - No physical access to the stream -No different activities for different generations 	<ul style="list-style-type: none"> -Walking beside the stream -Planting around the river -Possibility to sit beside the stream and get together with the family in the site -Possibility to give walk to the pets around the stream - Strait form of stream 	<ul style="list-style-type: none"> -It had great nature in the past - Water was shining and clean -There were birds such as swamps, docks around the river
Male (15persons)	<ul style="list-style-type: none"> -Low quality of the water -Dirty environment -Wrong changes are done on the river -Destruction the view toward the see from the site -Poor vegetation -Uneven planting -No diversity in the riverine landscape 	<ul style="list-style-type: none"> -No special activities around the river - Current Meadow Park has created entertaining opportunities -Inappropriate land uses the stream 	<ul style="list-style-type: none"> - Seeing the bird in the river -Hearing the sound of water -Access to see the water -Sitting beside the river -washing hands in the water - Having sport equipment around the river -Sinuous form of stream 	<ul style="list-style-type: none"> -Animals like squirrel were on the site. -Amount of water was large -Playing around the stream as possible. -The largest trees were located around the stream and made a shadow on the site. (Some of them still remain on the site). - Riverside was green and had native vegetation -There was a vast view from the site to the see

3. RESULTS AND DISCUSSIONS

What was accomplished on Beykoz Stream is neither the ecological restoration nor an aesthetic restoration. It seemed to be a temporary solution to solve the problems pertinent to the river but then brought about worse environmental and scenic issues. In this research, analysis of the natural and physical features of the stream locating in urban matrix helped the authors to attain a comprehensive view of the site in order to set up pertinent interviews with the residents. Those analyses could give brilliant background about the site landscape before running the interviews.

The ecosystem service, biodiversity, and the stream visual landscape can be improved by some techniques such as in-stream habitat improvement, water-quality management, canal reconfiguration, removal of illegal uses by the stream in the northern parts which has reduced the amount of water, and finally planting native vegetation. Such as, in the northern and natural part of the Beykoz Stream which can hold a wider canal, a green - vegetated corridor is suggested. A densely vegetated stream canal controls entering the dissolved substances such as toxins, nitrogens, and phosphorus into the stream by root absorption, friction, clay and soil organic matters (Figure 9).

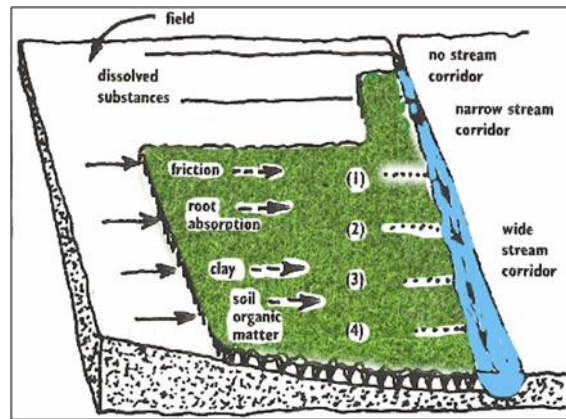


Figure 9. The contact with plant stems, plant root, clay particle, soil organic matter hold and absorb dissolved substance and keep the water quality up [31].

According to the book of “Landscape Ecological Principles” (1996), one of the other techniques that can be practical for the Beykoz case is to maintain interior and upland habitats around the canal on both sides to provide a habitat for species, to control the flood and dissolved substances entering. Besides, maintaining a latter-pattern of large patches crossing the floodplain provides trap sediment during floods, a hydrologic sponge, and lodges for fish species (Figure 10) [31].

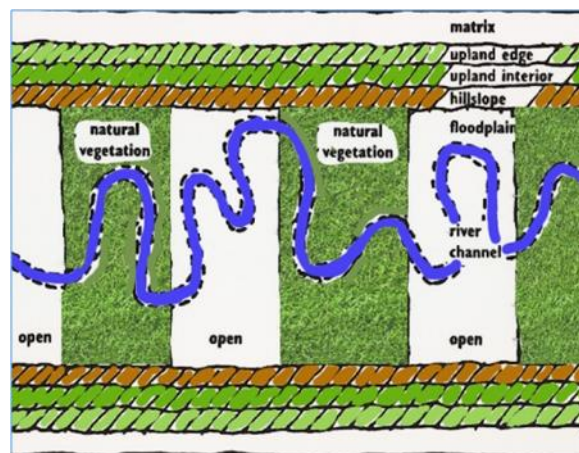


Figure 10. To maintain a natural process, an order of upland and interior land on both sides, which is wide enough to control flows from the matrix and act as habitats for species [31].

The Beykoz stream could provide a chance that the residents contribute to enhancement or restoration activities and improve the social and cultural dimensions of the stream changes. In this research, interview with the residents could provide a general view of their feelings, perceptions, preferences, and their memories of the changes performed over the stream. In this research, a few numbers of individuals (22 persons) were selected to be asked about the stream, as it was not easy to find a person who wanted to have a long discussion and had enough information about the site over history. However, the interview with those numbers of the person could provide good information. The individuals' comments were mostly about the visual elements of the stream, the possible activities that can be implemented around the stream, the comparison between the current and past situation of the stream, and their memories related to the stream landscape.

Two groups of interviewers (men and women) forwarded some different and some similar viewpoints and preferences. The men seemed to be more interested to discuss their cultural and social memories related to the stream. They were discussing historical and even political events and how the events

could affect the stream. For instance, closing the shoe factory around the stream and the mayor's plan of changing the stream that had caused some people lost their houses around the stream were described during the interviews. However, both of the groups complained about the quality of the water and dirty riverine landscape.

Low quality of water in the Beykoz streams has conveyed a negative feeling to the public. Thus, the improvement of the water quality in the restoration plan of the urban streams should be in the priority. They wish it could be just like before (around 12 years ago), even though some issues of the stream like seeping into houses were solved. Low and muddy water of the stream has caused that they wouldn't like to take a look at it. Furthermore, both groups prefer to have various functions in the riverside including the possibility of sitting beside the stream, possibility to hear the sound of water and washing hands in the water. The men preferred the sinuous form of the river as they believed the sinuous canal of the stream is able to clean the water and has more ecological benefit, while the women preferred the strait form of the stream.

Establishment of a park in the lower part close to the stream on a meadow (Cayiri Park) in the recent years is the only change that has made the persons satisfied. It gives them an opportunity for various functions from weekly bazaar to numerous entertainments for the children in the park. In addition, interview with the elderly residents proved that they really want to conserve the stream, even though it has lost most of its unique and natural beauty. According to the residents' remarks, in the past, the stream was flowing in the village and had great natural features with a larger amount of water. Elderly people who got retired spend most of their time in the place and feel that stream belongs to them. Therefore, the extreme changes of the stream have had a deep influence on their feelings toward the stream and decreased the sense of place to them.

4. CONCLUSION

Rivers play important roles in the city not just by their ecological and economic functions, but the social and cultural values they involve. In fact, rivers acting as green corridors have various functions, services, and values to the residents in the cities, which should be discovered during any restorative or enhancement project.

This research by providing an example of İstanbul as case study, tries to draw the attention of the researchers to the importance of human-social dimension related to the river projects. People, who have been witness to the changes within the urban landscapes or urban ecosystems over time, are often able to evaluate the operations and restorative activities better. There are special points in view of the residents about natural corridors like the streams that should be evaluated before any restorative operation. Changes and any restorative actions in the urban environment are connected with various social, political and ecological memories and values of the people who are living in the site. Changing the stream canal and its bed and its surrounding landscape with no care of the residents' dimension will lead to decreasing and disturbing the place identity, valuable sense of belongingness, and the meaning and unique memories related to the rivers. Visual access to the stream, its natural landscape with native vegetation, and even sound and color of the water are the factors which should be considered to maintain during the urban development plans as well as the aesthetic and ecological improvements and enhancements.

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