Water Elements in The Creation of Public Space

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Abstract. The need to create high-quality sustainable urban structures is widely emphasized. An important place among the elements shaping a sustainable urban space is occupied by natural elements, including water. The importance of water results from its multifaceted impact both on the physical conditions of the city and its beauty. The article draws attention to the role of water elements in shaping public spaces in the areas of European cities. The role of water in the creation of public spaces and the very diverse range of functions fulfilled by it was emphasized in a particular manner. Among the water elements found in urban spaces, the largest group consists of fountains and bells and whistles. Over the centuries, these water elements played a variety of functions: utility, cult, aesthetic and climatic, while being a significant element of the composition. Selected examples presented in the article concern both historical and contemporary use of water in shaping urban squares and green park and garden spaces. Analysing contemporary examples, particular attention was paid to the use of water elements for ecological remodelling, as well as reviving and increasing the attractiveness of revitalized areas in the urban tissue. This interest in water as a material with a wide variety of possibilities, which results from its physical properties, resulted in a variety of functional and spatial solutions. The research and studies conducted for many years by the author regarding the participation of natural elements, including in particular water and greenery, in the shaping of urban structures were the basis for the considerations. The public spaces with water elements analysed in the paper are places with high aesthetic values. They serve recreation, rest, education, promote social bonding, and are often places for organizing various cultural events or historic happenings. Water in these spaces is not only an element of the composition, but also a factor shaping a special microclimate. The potential of water for the creation of urban space is enormous and still not fully utilized, which is confirmed by subsequent realizations, encouraging with artistic and technical solutions, indicating the ever new possibilities of using water.

1. Introduction

The specific and diverse use of water in urban space, its impact on people and his environment, was determined by its specificity. As an element of the natural environment, it is the source of:

-the richness of sensations, starting from aesthetic ones, through emotional experiences, to which attention has been paid for many years in a particular manner in the works in the field of psychology, sociology, philosophy and medicine [1,2],

-symbo of variation, rebirth, magic, purification, life [3],

-specific microclimate that occurs in the vicinity of water elements [4].
Studies and research on the role of water and its significance for life and development of all human activities, ways of managing it and various possibilities of its use in creating a high-quality urban environment are interdisciplinary [5]. Basically, two groups of these works can be distinguished. One group includes works on urban and architectural issues indicating the utilitarian, composition, cultural and defensive function of water in the historical and contemporary development of cities. The second group includes specialized studies: on the functioning of water-land ecosystems, ecohydrology, hydrology and hydrotechnical issues, participation of water in shaping the urban microclimate.

Among the works on contemporary problems of shaping urban structures, one can distinguish works on the use of water elements, e.g.: in the ecological reconstruction of cities [6,7], in shaping urban public spaces [8,9], in shaping green areas and recreation areas [10,11]. Nowadays, in the face of global threats, the need to respect water resources, their management and their sustainable use in particular in urban areas is particularly emphasized [12].

The aim of the article is to show different ways of using water elements in shaping the public spaces of European cities. Selected examples presented in the article concern both historical and contemporary use of water in shaping urban squares and green park and garden spaces. When analysing contemporary examples, particular attention was paid to the use of water elements for ecological remodelling, revitalizing and increasing the attractiveness of revitalized areas in the urban tissue.

Urban analysis based on studies and field studies was carried out, as part of which the photographic documentation was prepared, and the iconographic and cartographic material was collected and analysed. The selected examples presented in the article concern both historical and contemporary use of water in shaping urban squares and green park and garden spaces.

2. Water in the space of historical city squares and green areas: an outline

Among the artificially formed water elements found in urban spaces and green assumptions, the most numerous group are fountains, taking various forms. Very often fountains decide about the identity of these spaces, while being the main elements of their composition. The compositional role of these elements depends on their scale, location in the space of the square, or the green assumption, and to a large extent the size of the square itself, or the extent of the park space.

In Europe, water as an element of urban space has already appeared in ancient times. In ancient Greece and Rome, where the aqueducts supplied water to almost 40 fountains. Archaeological research in Pompeii revealed the existence of free standing fountains along the streets, and smaller fountains located in the courtyards of wealthy house of the city’s inhabitants. In the Middle Ages, fountains appear mainly in palace gardens, for example, a fountain from 1295 installed in the gardens of count Artois in Château de Hesdin, and in the space of monasteries where they serve for washing before religious rites.

The Renaissance period is the designation of compositional locations for fountains in the areas of squares and parks. The use of water in the most-known palatial assumption of antiquity dates back to the reign of the Emperor Hadrian, the summer residence of the Emperor known as Hadrian’s Villa (Figure 1) located in the vicinity of Tivoli. The Renaissance garden with 500 fountains is also located in this small town at the church of Santa Maria Maggiore. The garden was established in the 16th century with the initiative of cardinal Ippolito’d Este. Once a private property, nowadays a place crowded with tourists who admire this garden unchanged
for almost five hundred years, admiring the unusual richness of water reservoirs richly decorated with decorative sculptures. Walking down the Alley of a Hundred Fountains, admiring the fountain of Sybil, which is guarded by nine nymphs, or the fountain of Neptune with a wonderful complex of cascades and fountainheads (Figure 2). One can also listen to the sound of water organs in the green area of the park. Solutions used in the Villa d’Este garden by Pierro Ligurio over the centuries have many times been an inspiration for designers of water garden foundations.

Figure 1. “Canopo” – Hadrian Villa in Tivoli. One of the water elements of the palace’s foundation. (photo by author, 2013)

Figure 2. Di Nettuno fountain - Villa d’Este in Tivoli. (photo by author, 2013)
To this day, they delight with the richness of forms and technical solutions, dynamic layouts of fountains, contrasting with large surfaces of water in swimming pools, water bases or canals, located on the main axes of the great Baroque foundations: Peterhof, Zwinger, Versailles, Schönbrunn in Vienna, or Herrenhausen near Hanover. It is the gardens of Versailles that are the best examples of the French school of Baroque. In the space of the park, fountains constitute the main dynamic element of the composition. Water sprouting from the fountains was formed into poles, plumes, fans and bouquets, accompanied by music and fireworks, which together created great outdoor performance. Baroque fountains located in the space of city squares also emanated with emotions and movement, their main element includes sculptures, while water is their complement. This is particularly visible in the Roman fountain di Trevi (Figure 3). The monumental fountain adjoins the building’s wall. The central place of the composition is occupied by a sculpture depicting Oceanus, who is surrounded by tritons and water nymphs. The water pool with sculptures filling it occupies almost the whole space of a small square, constituting its spatial and functional dominant.

Figure 3. Di Trevi fountain – Rome (photo by author, 2013)

The 19th century brought many changes in various areas of life, also in the history of fountains by using new materials for their construction. In various European cities, fountains are created using new materials: cast iron – Fontaines de la Concorde (1836-1840) in Paris, glass – Crystal Fountain in London (1851), and even aluminium was used – Shaftesbury Memorial Fountain in London (1897).

Among the 19th century green foundations, in which water elements played an important functional and compositional role, public parks formed in various European cities should be mentioned [10]. Such an example is the oldest public park in Barcelona. In 1873, the Ciutat Vella district opened Parc de la Ciutadella. The author of the green assumption, then with the area of 31 ha, was JosepFontserè. To this day, the park is an attraction of the city willingly visited by the locals and tourists. Within the park, there are two water objects: The Cascade Fountain and a pond located in its vicinity. The
monumental neo-Baroque fountain, in which the statue of Venus was placed in the central part, was designed by Josep Fontserè and realized in the northern part of the park at the closing of one of its main axes. The space around the fountain is a place for organizing various events: concerts, fairs, exhibitions.

3. Water as an element in shaping public spaces in the 20th century and early 21st century: selected examples

Nowadays, the role of water in creating the quality of the urban environment is universally emphasized, and above all, its multifaceted impact both on the city’s physical conditions and its beauty [7,8]. The Expo 2008 exhibition in Zaragoza, with the slogan “Water and sustainable development”, was dedicated to the significance of water for the life and development of all human activities and the ways of its management. As in previous ages, water elements play a variety of functions in public spaces of cities. Above all, they are one of the elements of the composition that increase the attractiveness and prestige of these spaces, and often also the inspiration to undertake artistic activities.

The fountains built along Avenida Maria Cristina in Barcelona were supposed to have a prestigious importance. Because they were created for the celebrating the world exhibition held here in 1929. Fountains were made according to the project of Carles Buïgas. The “Magical” fountain was the largest and the most beautiful of them. Thanks to the construction solutions used, they eject water jets at the height of several dozen metres, which, combined with light effects and music, creates great light and sound performances, admired by thousands of tourists. Nowadays, it is one of the places of Barcelona that is obligatorily visited by tourists.

The Neo-classical fountain “Pallas Athena” designed by Karl Kundmann from 1902, erected in front of the parliament building in Vienna, is an example that fountains can perfectly emphasize the monumentality of the building.

The creation of the fountain was sometimes an inspiration for further design activities. The work of Gustav Adolf Vigeland son the park currently named after him, and which is part of the park complex Frognerparken in Oslo, began from the design of the fountain in 1907. Currently, the fountain stands on the main compositional axis of the Vigeland park, in which the characteristic elements include the stone human figures, prompting to reflect on the meaning and stages of human life.

The phenomenon, which intensified in the 20th and the beginning of the 21st century, is the significant and diverse participation of water elements in shaping the revitalized urban areas. The water elements appearing in these spaces enliven them, they remind us about the past of the place, emphasizing its identity, also fulfilling an educational and cognitive function, and through its dissimilarity resulting from the physical properties of water, they shape the microclimate of the place and provide a variety of sensations. In the spaces of city squares and parks with the use of new technologies, spectacular light and sound performances are created. Spray pools, or their splash pad variety with an anti-slip floor, give free access to water to the passers-by, providing coolness and a favourite playground on hot days. Fountains take various forms, e.g. streams of water gushing from the floor, water curtains, cascades, etc.

The flagship example of the use of various water solutions in shaping public spaces are contemporary parks of Paris, created in post-industrial areas, including postmodern parks: de la Villette, created on the grounds of the former Paris slaughterhouse and animal market, by Bernard Tschumi, or the André Citroën park with dancing fountains and water cascades, commissioned in 1992, designed by: Gilles Clement, Patric Berger, Alain Provost, Jean-Paul Viguier, Jean-Francois Jodry. A particularly interesting example of revitalization of post-production areas with the participation of water elements is the Belleville park in Paris, perfectly inscribed in the terrain with terraces and slopes, with a series of cascades and pools along its one hundred metre main axis, connecting the so-called belvedere with a water garden at the foot of the hill. Park Belleville was designed by the team under the direction of architect François Debulois, in the areas of a closed gypsum excavation site. On the top of the hills, the slope of which is occupied by the park put into use
in 1988, Maison de l’Air was erected, and there is an observation deck from which one can admire one of the most beautiful panoramas of Paris.

An interesting example of using water to recall the industrial history of the place can be found in the revitalized post-war areas in the area of the King’s Cross station in London. In the Granary Square area, the main square of the revitalized area, in front of the former granary building, four “water squares” were designed (Figure 4). Squares are a kind of record of the water history of the Granary Square. There was a port pool in this place of “water squares”, where the barges were loaded with coal imported from northern England and grain transported later into various parts of the city. In the space of Granary Square, the drawing of four “water squares” is determined by 1080 water jets equally spaced. The appearance of water in 100 different, most effective dynamic choreographic systems and the colouring of gushing water changing to the rhythm of music, is controlled by a computer. At dusk, the illuminated façade of the granary is reflected in the smooth surface of the water mirrors, or is the background for colourful water creations. A special effect is caused by the appearance of a delicate white mist over the water mirrors, which covers the space of the square causing a spectacular effect. Water performances can be enjoyed day and night, for example, sitting on stone benches parallel to the façade of the Granary along the shorter sides of the “water basins”.

The so-called “water mirrors” appear on the revitalized areas more and more often. In recent years, several such water elements have been created in the revitalized spaces of European cities. They constitute a compositional and functional element of revitalized urban squares, for example, in Chartres and Bradford.

In Chartres, the water table is located on the Place des Éparts. Since 2006, this space is the place where the “Water Festival” takes place. While in Bradford, Mirror Pool with a surface of 4000m² is the main compositional and functional element of the City Park. The water table commissioned for use in 2012 is the largest in terms of area in the United Kingdom. Water mirrors are also an element that increases the attractiveness of urban promenades, as exemplified in the “mirrors” in Nice and Nantes.
In Nice, the “water table” made in 2013, with an area of 3000m², is located on the promenade surrounded by greenery. The variability of these two elements, their mutual spatial relations allowed to create an elegant urban space.

In Nantes, “Miroir d’eau” is located in the vicinity of the castle, in the place of the old Loire canal. The “Mirror” with an area of 1300 m² commissioned for use in 2015, is part of a larger project carried out in this part of the city, called “La promenade de Nantes”. Water with two-centimetre thick layer covers the floor, made of triangular granite slabs in grey and black. The layout and colour of the panels makes the impression of being in one of the castle interiors. The water reflects the walls of the castle, the silhouettes of passers-by, street traffic, jets in various arrangements from the nozzles placed in the floor, or fog enveloping the square, which in particular at night in connection with light effects creates a unique scenery. The water is filtered and disinfected. Free access to water favours various activities, including artistic happenings, but above all, fun. In 2015, the surface of water became a symbolic place where homage was made to the victims of the terrorist attack that took place on November 13, 2015 in Paris, by placing lit candles on the surface of the “mirror”.

The most famous “water table” is undoubtedly “Miroir d’Eau” in Bordeaux. It was implemented in the years 2005-2006 on the Garonne quay, and its waters reflect the monumental edifice of the Stock Exchange. The 3500m² water-filled space is part of the revitalized Garonne boulevards in Bordeaux. In the immediate vicinity of the “mirror”, on both sides, there are “Le Jardin des Lumieres”, a variety of forms and functions of a green space. The design of the mirror is the result of cooperation between Jean-Max Llorca, Michel Corajoud and Pierre Gangnet. According to Jean-Max Llorca, a well-known Parisian creator of fountains and water installations, the inspiration for the “mirror” was a phenomenon that occurs naturally in St. Mark Square in Venice. Dance shows are organized on the “mirror” glass in Bordeaux, accompanied by special lighting that changes the space into a specific theatrical stage. The square in front of the Stock Exchange building is also a place of concerts and occasional events.

4. Fountains in the urban space – symbol, customs, legends and traditions

Water has always been an important element of the city inhabitants. This is confirmed by the fact that water elements existing in urban spaces are related to different customs, traditions and even legends. He fountains commemorate historical figures or events significant for the city. They have a direct relationship with local tradition. They are a symbol of a city or its part, an element of identity and identification for users of a given area. They are also a place of eccentric behaviour and artistic provocations.

In the Middle Ages, the fountains symbolized the source of life, purity and paradise, and, as mentioned earlier, they were most often located in the grounds of the monastery gardens. Although there were also exceptions. The history of the “Beautiful Fountain” (Schöner Brunnen) from Nuremberg erected by Heinrich Beheim dates back to the Middle Ages (currently only its copy is located on the market, and the original is in the German National Museum), with which residents of the city so strongly identify today, that the installation of the Munich artist, Olaf Metzl, made on the occasion of the Football World Cup, which took place in May 2006, was considered a desecration of the fountain. Because the artist wrapped the “Beautiful Fountain” with a serpentine of stadium seats.

Among the habits connected with fountains, the most popular is the habit of throwing coins into the water of fountains, which is to ensure return to a given place. In almost every city of Europe, there is at least one such fountain. Visiting Rome, one should visit the Piazza di Trevi, not only to admire one of the most famous Roman fountains, the di Trevi fountain designed by Nicolo Salvi, but also to throw coins in it, thus ensuring a cheerful future and a happy return to the Eternal City. While the return to Barcelona, as the tradition says, will be ensured by drinking water from Font deCanaletas at Rambla de Canaletes.

An interesting tradition is associated with a small fountain crowned with the monument of Elżbieta Gęsiareczk (Gänselfisel) standing on the market square in Gottingen. According to the still-living
student tradition, immediately after defending the doctorate, the new doctor is taken to the market on a cart pulled by students. According to the ritual, standing in the pouring water, he kisses the sculpture on the cheek and hands it a bouquet of flowers. Equally interesting and alive is the custom, dating back to the 17th century, of dressing the sculpture-fountain depicting a peeing boy in various regional and historical costumes. This small sculpture-fountain from 1619, the work of Jerom Duquesnoy, is located in a narrow street near the Grand Place in Brussels. There are several legends associated with the boy’s figure. The di Trevi fountain also has a legendary past. According to the legend, the name of the fountain comes from the name of the girl, who found a source of water in this place. The waters of the fountain were also recorded in the history of the cinema by the famous bathing scene of Anita Ekberg from the movie “Dolce vita” directed by Federico Fellini.

Many of the fountains have also become symbols of cities. Such an example are the aforementioned: the fountain from 1901 with the monument “Gänseliesel”, which next to the University established in 1734 is the symbol of Gottingen, and the world-famous “Peeing Boy” (Manneken Pis) one of the symbols of Brussels.

The extraordinary fountain is also a symbol of the Güell Park and one of the symbols of Barcelona (Figure 5). The fountain consists of three parts, separated by two strings of stairs leading to the Hall of One Hundred Columns. On the lowest level, there is a grotto, above it there is a colourful salamander with the symbol of Pluto, the guard of underground waters and, above all, the medallion with the serpent’s head stands against the background of the flag of Catalonía, the symbol of wisdom. Judging by the crowds of tourists surrounding the fountain, one can undoubtedly say that this is where the heart of this fascinating, symbolic park that is just a fragment of the unfinished design of the Gaudi’s garden city, beats.

![Figure 5. The fountain that is a symbol of the Güell park – Barcelona. (photo by author, 2007)](image-url)
A special example is the fountain with a figure of the Immaculate Conception of the Blessed Virgin Mary on the St. Mary’s Square in Lviv, the history of the city reflected in her fate, and at the same time her religious identity. The author of the sculpture made in 1859 is the Munich sculptor, Jan Nepomucen Hauttmann. During the Soviet era, the monument was removed and moved to the Boims chapel, replacing it with a cast iron mantle decorated with tritons. The restored fountain with a statue of the Mother of God returned to its original place only in 1997.

One of the latest symbolic water assumptions is the monument of Sinti and Roma murdered during the Second World War located in the vicinity of the Reichstag in Berlin. The monument was designed by the Israeli artist, Dani Karavan and completed in 2012. The main element of the monument is a shallow water reservoir in the shape of a circle. The thin layer of water that fills the reservoir, which bottom is lined with a black stone, reflects the crowns of the park’s trees and the figures of people coming to the park are bending over the water. In the middle of the water surface, there is a triangular stone, which disappears under water every day at the same time accompanied by the violin, to reappear again with a fresh flower lying on its surface. The place of remembrance is surrounded by the glass fence on which the most important dates related to the crimes committed against the Roma and Santi have been printed. This place is full of symbols: water is changeability, passing away, life, but also the blackness of the bottom of the reservoir – the abyss, depth. A special place that encourages reflection.

The monument-fountain erected in 1992 in the Green Park in London is equally beautiful and symbolic. The Canada Memorial fountain by Canadian sculptor, Pierre Granche, commemorates the Canadian soldiers who died during World War I and II(Figure 6). Water flows down the inclined surface of the monument, covered with carved maple leaves, creating an illusion of constantly flowing leaves.

![Figure 6. Canada Memorial fountain – London. (photo by author, 2014)](image_url)

5. Summary and conclusions
Nowadays, the need to create high-quality urban structures is widely emphasized [13]. Elements of nature, including water, occupy an important place among the elements shaping urban space.

Over the centuries, water elements played a variety of functions: usable, cult, and served as decorations. They brought refreshment and life into the sun-heated spaces of palaces and courtyards, parks and gardens, while at the same time constituting a significant element of their composition.
Among the water forms found in urban spaces, the largest group were the fountains and bells and whistles. The water gushing from the fountains symbolized the secret forces of nature, reminded us of the constant change taking place in nature. Flowing water was considered the soul of the garden. The water carried relaxation, lured with noise, reflections of the light, variability depending on the seasons, day and lighting.

Nowadays, water elements are found in downtown historical urban complexes, they constitute an important element of composition in newly created public spaces, they are also used to revive and increase the usability in revitalized urban areas. Water is also an inseparable element of historical and new steam and garden assumptions. Fountains are also a significant element of the composition of currently created parks in post-industrial and degrades areas. The establishment of these park assumptions was usually part of a wider program of revitalization of degraded urban areas.

Nowadays, particular attention is paid to the ecological use of water in public spaces of cities. The potential of water for the creation of urban space is enormous and still not fully utilized, which is confirmed by subsequent realizations, enchanting with artistic and technical solutions, indicating the ever new possibilities of using water.

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