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## **Green network in urban pressure**

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### **Introduction**

Budapest is a lucky city from an urban ecological point. Thanks to the Danube cutting through the middle of the city the ventilation of downtown is adequate. The existence of this natural waterflow offers a good possibility to create a green-blue infrastructure, which can be realized in the near future by turning the Pest side embankment partially into recreational open spaces.

In spite of the favourable location the air quality of Budapest is often below the critical level, first of all in the city center. Though this unfavourable situation has numerous components- first of all the difficult traffic related problems and the national and international through-traffic in the downtown – in terms of landscape architecture the biggest problem is the isolated green surface system and the lack of linear connecting elements.

Due to its morphology, the Buda mountain-chain and the tectonical valleys differing in size and running towards the city center, the Buda side is in a much better position. There are the three major green wedges protruding into the city fabric till the line of the Danube, among which Devil's Ditch (Ördögárok Creek) is the most intact one and due to its central location and length, probably the most important as well. As north-western wind is prevailing in and around Budapest, this wedge plays an essential role in ventilating the air of the city and contributes to the acceptable air quality of Budapest. This paper aims to introduce the history of the green wedge and corridor along the Devil's Ditch. The areas next to the creek and at the bottom of the hills - as military protection zone of the Castle- remained unbuilt till the end of 18<sup>th</sup> century except for the Gellért Hill foot hill and the Tabán area. In the next two centuries some development sites were cut out here and there from the characteristic green wedge. The importance of this ventilating green corridor, although not continuous any more, was realized by the urbanism of the 20<sup>th</sup> century.

### **Goals and objectives**

The history of openspace development along Devil's Ditch Creek dating back to the 18<sup>th</sup> century is a typical example, how green corridors have been developed and changed during the course of time in Central European cities. Our main question was, how the city gradually realized the importance of the

“left-over” greeneries as green corridors in the more and more densely populated urban fabric and which are the developments endangering its effectiveness. Nowadays touristic considerations overwrite the interest of the city and even in the green corridors there are token developments. By analyzing the changes of the Vegetation Index Value of the examined sites we can get a clear picture, how the developments of the last 10 years have affected the biological activity, directly connected to the urban climatic role of the green corridor. (Jombach, 2012) Moreover it is also exciting from a landscape architectural point of view, that some parts of the green corridor are World Heritage sites and there are some iconic landscape architectural works from the late modern period, to be renewed in the future. From an urban ecological point of view favourable developments are the ones preserving the green corridor’s complex role in the city.

## **Methods**

As step one we studied the professional literature to uncover how Devil’s Ditch Valley has been transformed into a green corridor in the last 300 years. The changes of the built-up system were tracked by comparing the historical maps of different periods. The changes of the recent past could be followed up by reading different descriptions and assessments of the new developments. The recent regulation plans of Budapest are also “talkative” regarding the regulation background of the new touristic developments on areas which are extremely sensitive in terms of ecology and city climate. The changes of the biological activity are measured by comparing the Vegetation Index rates of the last 15 years. (Jombach, 2012)

## **Results**

The green network of a city is determined primarily by its topography and the urban structure. In case of Budapest all natural and men made features suggest a traditional ring – radial green system. Owing to different landscape structure and urban development trends the green network of the Buda and the Pest side are unlike. Many elements and parts of the ring-radial urban green system originally planned and partly also constructed have already disappeared mainly due to developments during the last 100-130 years on the Pest side. The favourable landscape structure of Buda did not ask for urban green belt development. The valleys connecting directly the surrounding hills with the Danube usually provided ventilation for the city. There are three main valleys on the Buda side; the first one runs from Elisabeth Bridge through Tabán and Németvölgy, the second one is Devil’s Ditch valley, most important for our research stretches along the Gellért Hill- Tabán- Horváth Kert- Vérmező- Városmajor parklane and the third one runs along Szépvölgyi Street further up north.

Devil's Ditch is a temporary creek, one of the right side tributaries of the Danube. The creek springs in the Buda Mountains, and flows through Nagykovácsi and Remete-canyon reaching Budapest at Hűvösvölgy (Cold Valley). From Budagyöngye Square the creek runs in a pipe under the surface. Flowing under Városmajor, Vérmező, Horváth Kert and Tabán it reaches the Danube just above Elisabeth Bridge. Though Devil's Ditch is an important ventilation channel since ancient times in its full length, in the suburbs there are only low density built-up areas next to the creek, which do not endanger ventilation channel- and green corridor - functions. In this research we focus only on sections where the creek runs- underground- in more intensively developed quarters, beginning at Városmajor and advancing towards east, south-east. Until the end of the 19<sup>th</sup> century Devil's Ditch remained an eccentric, dangerous creek with serious floods when the city decided to channelize the water course. Later the intensive urban development of the 20<sup>th</sup> century highlighted another very important function of Devil's Ditch valley, namely the strong air channel function, which became more necessary from urban ecological and climate points of view. The natural green belt of the Buda hill foot down to Devil's Ditch along the west side of the Buda Castle Hill was traditionally used as military protection zone in medieval times. The so-called glacis (military protection area) lost its original function after the Turkish armies had finally left the Buda castle in late 17<sup>th</sup> century. The land use changed step by step from military protection to recreational use and also for development purposes. The first pleasure garden of Buda was created on the north end of the glacis at the turn of the 18<sup>th</sup> century, while a large part of the area at the west slopes of the Castle hill remained in military function up to the end of World War 2 with some residential blocks, which were permitted to be built here. The rest of the creek down to the Danube was more divided in function, with a densely built-up settlement of the Rác town up on the slopes of the Gellért Hill.

The northern part of the military protection zone became the city's property in 1729, and the landscaping of this area, called Városmajor started, with the plantation of 3000 saplings in 1780's. The first territorial loss happened in 1873, when the terminal of the cog-railway was placed in the park. From the 1820s the development on the eastern side of Városmajor Street reduced gradually the size of the park as well. The tendency continued at the beginning of the 20<sup>th</sup> century, when two churches were built here. After WW 2. the club building and the sportfields of the Budapest Sport Club were placed here, and the Városmajor Open-air Theatre cut out more areas of the park. Due to the elm disease in 1965-66 some 200 years old giant trees died (Radó, 1985). In the 1980s two developments caused further territorial losses, the placement of the Városmajor High school and the new Headquarter of the Telefon Company.



**Figure 1. The location of the Devil's Ditch green corridor in the intensively developed part of Buda**

The second element of the green corridor, the Vérmező remained military exercise area till the end of WW2, and was filled up by the debris of the ruined Castle District after the war. It was first landscaped in the 1950s when huge perennial flowerbeds decorated the park. In the 1970s during the construction works of metro line 2 it was used as a temporary building area, so after finishing the construction works it had to be landscaped again. In the view of this it is understandable, that the park doesn't have any significant old tree population. (Szilágyi, 1996)

Though the area along Devil's Ditch south-east of Városmajor was under military authority for a long time, the military zone was narrowed at certain places and some developments were still permitted here, like some built-around Pauler Street. Horváth kert (Horváth Garden) was originally a resort with a nice villa of the Horváth family, later bought by the city. The Summer Theatre (Nyári Színkör) was built here in 1843 and at the southern side, where today a playground can be found, once the building of the Athletic Association stood. Both buildings were demolished in the 1930s. (Gombos, 1974) There was an interesting period in urban development in the 1950-60s, when City Council planned to open up the green wedge and air channel in its full width

by demolishing the residential blocks between Horváth Kert and Vérmező. The idea was given up and the contrary happened: some new housing developments, even a high rise building were placed into the air- channel.

The next element of the green corridor, the Tabán has been populated since ancient times. After the Turkish occupancy its urban development accelerated, though the regular floods of Devil's Ditch creek caused many problems. In 1933 the old Tabán was demolished and the area was landscaped in 1936, which can be considered as a very early brown-field development, proceeded by a planning competition. One of the entrees suggested creating a 700-1000 m wide green lane parallel with the Danube. The idea of placing a spa resort here arose already at that time, in the 1930s. After WW2 in 1966, when a new overpass at the Buda Bridgehead of the new Elisabeth Bridge was built, Tabán was landscaped for the second time. The medieval Rác Bath was remodelled between 2005 and 2010 and a new hotel complex was added, despite being opposed by the landscape architects under urban ecological consideration. Due to legal debates the complex hasn't opened for six years. The other recent development in Tabán is the Oxigén Wellness Centre, opened in 2010. Though both the new hotel building and the wellness centre has a green roof and seemingly the architectural concept respects the green environment, the new roads leading to the wellness centre and the enlarged car traffic and noise pollution triggered a hot protest of the local residents and NGOs. As the hotel hasn't opened yet, it is not palpable, how much extra traffic load it will generate in the core greenery of Buda. While the natural hot baths of Buda are typically located at the foot close to the Danube along a geological trench, the Oxigen Wellness centre is placed on the hilltop, disturbing the natural and logical line of the hot baths.

The last element of the green corridor is Gellért Hill, an approx. 140 m high dolomite formation next to the Danube, with very steep rocky slopes on the riverside. There used to be vineyards on the southern and western hill slopes, which did not survive the filoxera disease in the middle of the 19<sup>th</sup> century. The Citadel was built in 1852 on the top of the hill, and in 1901-02, when the embankment was built along the river at the foot of the hill on the eastern side, was regraded considerably and huge retaining walls were built. The landscaping of the southern hillside took place the same year. An ancient cave in the southern side of the hill was enlarged and turned into a cave-church (grotto) in the 1930's. In 1965 the Jubilee Park (Jubileum Park) was opened next to the Citadel, a great example of late modern landscape architecture with some nice statues in a fantastic visual position. In the 1970s the water demand grew rapidly due to huge housing estate developments in the southern Buda region. To improve the water supply an underground water reservoir was built

on the northern slopes of Gellért Hill, which was fitted into the hillside by grading and then the surface was landscaped, setting a nice example of integrated land use.

## **Discussion**

The inner green belt of Buda had to suffer territorial loss due to housing developments partly in the 19th, mainly in the 20<sup>th</sup> centuries and also due to some dynamic touristic developments in the past decades. It can be observed, that the strong green surface system approach of the city council in the 1930s brought many positive changes on the studied area (the demolition of the old buildings of Rác town in Tabán, and Horváth kert). The placement of the water reservoir underground on Gellért Hill is another positive example from an urban ecological point of view. The urban pressure is still very strong and nowadays the focus is on the touristic attractions and developments. Buildings of a new bath and a hotel may seem „softer” developments, but all these threaten the integrity of the green corridor and reduce the green surface, moreover, they induce an increased motorized traffic.

Though nowadays the green corridor is somewhat fragmented due to all those developments, it still functions more or less as a ventilation channel. Even if there is no possibility to get rid of the impacted blocks of houses by demolishing them, by developing some linear green elements, such as alleys of trees to connect Városmajor and Vérmező might cause further improvement. Fortunately the direct connection between Horváth Kert and Tabán still exists in full width. The re-establishment of the long missing connection between Vérmező and Horváth Kert is a tougher issue, but some tree plantation inside the existing residential blocks would definitely help.

The importance of the green corridor along the former „glacis” is increased by the fact, that it compensates the shortage of greeneries on the Pest side. While new, partially green recreational open spaces will be created on the Pester embankment of the Danube according to the Rak-Park Project, promoting the openspace use along the Danube both by the locals and tourists, there is not even a word about getting rid of the present car traffic along the Buda embankment and creating an easy pedestrian access to the waterfront. This is why it is essential to preserve and protect the existing values of this green corridor along the Devil’s Ditch and strengthen the existing connections. Moreover, in the estuary zone the protection of views is a prime issue as well.

## Conclusion

The openspace use of green corridors and wedges is a hot issue even nowadays, in spite of the urban regulations. It is the duty of landscape architects to determine, what kind of and what size of developments can be placed in these areas without damaging the main function, to provide ecological corridors and ventilation channels in the city fabric and improve the climate of Budapest. Cities of the 21st century look ahead a strong development and spread, therefore the role and the necessity of a well-structured urban green system is multiplied.

The protection of landscape architectural heritage is increasingly important nowadays. The Gellért Hill (together with the Castle Hill) is part of the World Heritage Site along the Danube River. Tabán, Vérmező and Városmajor are registered big urban parks in Budapest, so many elements of the green corridor are protected by other tools as well. Even so, we suggest giving protection to the whole green corridor as one unit. Moreover, some restoration projects such as the green surfaces of Gellért Hill are extremely acute, like the restoration of Jubileum Park in its original late modern style, the renewal of the eastern hillslope pathes connecting the Gellért Statue with the Grotta (cave-church) and Gellért Bath. Hopefully all those landscape restoration projects will improve the biological potential of the green corridor along Devil's Ditch.

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