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Urban permeability: on plants and plinths

INTRODUCTION

Human civilisation is becoming ever more urban. With the growing densification in our cities, green and open (public) spaces are put under pressure. As the number of built, non-permeable surfaces (such as asphalt and concrete) increase, storm water absorption, biodiversity and a pleasant microclimate in our cities is threatened. All non-permeable materials contribute to extreme water conditions in the city (low ground water level or flooding) and to the 'urban heat island' effect. Alongside with this development, the number and quality of public spaces is put under pressure. How do we provide the necessary built urban environment (housing, infrastructure) of a growing city, and at the same time enhance and offer lively, inclusive public spaces with a comfortable microclimate?

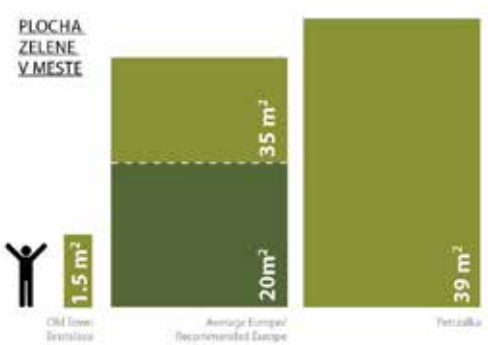
Climatological factors such as sun, temperature, wind and humidity largely influence our behaviour in, and usage of public spaces, and they even determine why we like to stay in certain places more than in others. They have an effect on how we feel, how 'comfortable' the circumstances of being outdoors are. Human comfort is a subjective concept. In a public urban environment it has to do with people's acceptance of spaces and their conditions. In this paper, I will introduce and highlight the concept of urban permeability, influencing not only human comfort but also climate resilience in urban spaces: open, breathing, absorbing and cooling green spaces in cities, on the one hand; accessible, inclusive, lively plinths and the public space formed by and in-between them acting as catalysts of social interaction on the other hand.

The focus here is on two districts of Bratislava, the Old Town and Petralka. Like in many other post-communist cities, the urban fabric (built environment) has gone through

degradation to a certain extent. The city does not grow and develop hand-in-hand with its ecological and climatological processes. The surrounding green hills and vineyards are gradually turning into housing areas erected by private developers. The city does not have a central park, and only very few urban parks which are threatened to turn into asphalt squares or underground parking lots. Reduction in green permeable areas of cities is one of the main causes for the increasing urban temperature, poor storm water management and decreasing air quality. Currently Bratislava does not have any legislative regulation on the protection of green areas in urban areas, as well as an economically sustainable strategy to create and maintain existing and new green infrastructure in the city.

What can a dense historic centre and a mass-housing neighbourhood learn from one another?

The two areas studied and compared in Bratislava are totally different (Image 1). One is a dense historic centre (Old Town) with scarce porous spaces and a vibrant social city life; the other a 1970s prefab mass-housing neighbourhood (Petralka) with an excess of unused greenery, but only a limited supply of vibrant public spaces for its inhabitants (Image 2). Both neighbourhoods have approximately the same density of inhabitants (around 4000/km2), however their urban fabric is totally different. Only 6% of the total surface of Old Town is open and green, while the European average is 35% (de Roo, 2011) within a direct urban living environment (Image 3). This dominant non-permeable surface area is contributing to the urban heat island effect. Density of functions (shops, cafes, ...) on ground floors is the highest in the whole of Bratislava and is the foundation of a vibrant urban life. Conversely, Petralka has a high amount of ground vegetation (about 66%) (Image 4) and open corridors letting fresh air enter, but a deteriorating public life due to large distances between buildings, disorientated planning and marginal social functions on ground level for people to pass by and meet. I will investigate how these two neighbourhoods can reinforce themselves and identify measurements that can be taken to fix the missing social and microclimatological links in their urban fabric.



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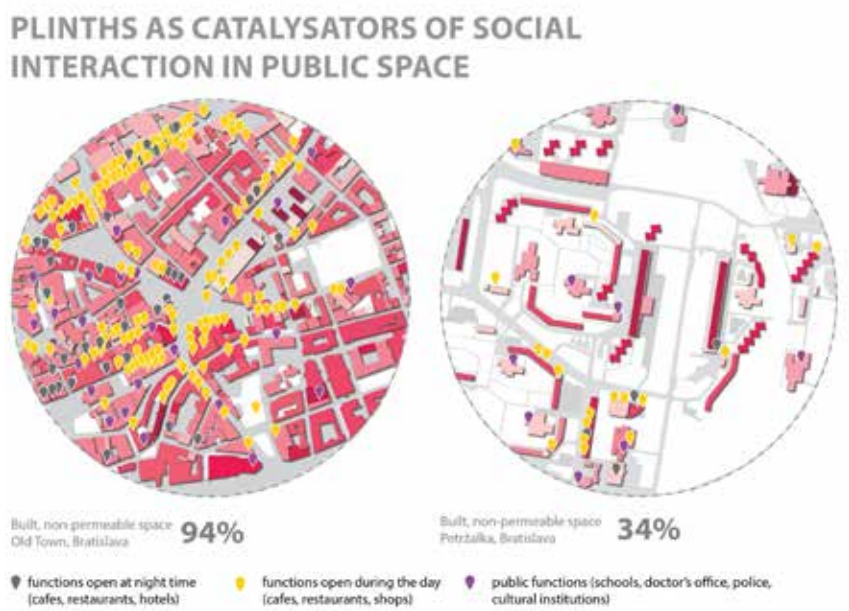
Learning from Old Town: urbanity through social action

A study by the Dutch office Stipo, The City at Eye Level (Karssenberg 2013), suggests that public functions in plinths on a 15m distance (approximately 6-8 times per 100m) contribute to a liveable, socially interactive environment. Petralka, a neighbourhood built in the 1970s – 1980s, is based on the principle of functional segregation. Although density of public functions within the plinth varies, a shop, restaurant or a school are located every 30 – 70m on a main street (Image 5).

One can also experience a very undemocratic street-scape, where cars dominate on every sidewalk, and sometimes hinder any connection of pedestrians with the ground floor (Image 6). Although the area is characterised by an excess of green public spaces, which the planners originally intended to be used for recreation, this excessive grass land is mostly used for taking pets out for a wee (Image 7). Hence, quantity of green open spaces does not correspond with an equally high quality of use. Nevertheless, the green areas of Petralka are the most valued characteristic by the inhabitants, and protect it, for instance, against a top-down development of a highway[1]. The question remains: how can the vast green areas be used better by the inhabitants, and could nature possibly act as a catalyst of social change? Urbanity of the Old Town in Bratislava is achieved through high density of the build environment and the great number of public functions which bring people not only socially but also physically together. Conversely, when buildings in a mass-housing neighbourhood like Petralka are tens of meters apart from another, they creates spaces difficult for social interaction as people cannot see or hear one another from such distances. What could be done to transform these spaces between buildings into a driver of social



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interaction while preserving the beloved ecological structure and pleasant climatological characteristics of the area?

One of the most important ingredients of urbanity, besides density, is active participation of the inhabitants in a community4. During the socialist times in Slovakia, the notion of the „empowered" citizen was not common, because it was perceived as resembling someone's private interest rather than that of a community. At present, an growing number of people are not only expressing an increasing need to go out and meet in public spaces, but they are also demonstrating their right and responsibility for public spaces[2].

What does this have to do with climate resilience? By letting people adopt and re-create the green spaces between their buildings, they will feel more responsible and connected to their living environment (Image 8). Why not plant an urban forest in these vast green areas (slowing down but not blocking the air circulation coming into the city) (Image 9 and b) with tree nurseries or playgrounds and sport facilities (with permeable pavement and bio-swales to capture storm water)? If well designed, thus transformed large open areas can act as incubators of social action, as part of a network of green infrastructure to attract people on foot or bicycle. Such a design would reconnect the built environment with the ecological and climatological processes of the city. Besides environmental development, such green urban areas are enhancing health and social benefits and are considered as community builders, and thereby strengthen social ties between the citizens.

Together with the development of a new green infrastructure, sidewalks would regain their role as pedestrian zone by removing the current car parking to obtain more open and accessible plinths. Permeability of facades would be made possible through letting local entrepreneurs settle, allowing partial integration between the public realm (square, street, sidewalk) with the private sphere (shops). This kind of development creates interaction, broadens our understanding and improves our experience of our urban environment. In Petralka, the currently weak layer of semi-public spaces can be strengthened through supporting small neighbourhood shops. Some of these already exist (Image 10), but because of the strict regulations of a mono-functional zoning plan, regulative barriers are imposed on private initiatives and local, small scale entrepreneurship.

8.
Source: the author

9a & 9b.
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10.
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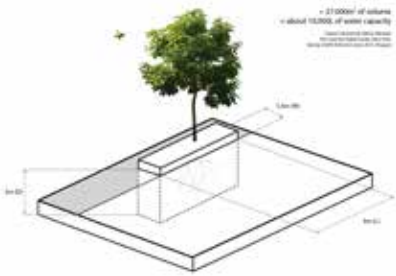
Learning from Petralka: reconnecting the urban with nature

Green, permeable surfaces form spaces in Petralka which do not only collect storm water (runoff storm water can be held up to 80%), but also cool the surrounding urban spaces. Because the Old Town lacks these kind of open spaces, a new strategy is needed to improve the (micro) climatological comfort of the old city, but also to reconnect urban life with nature.

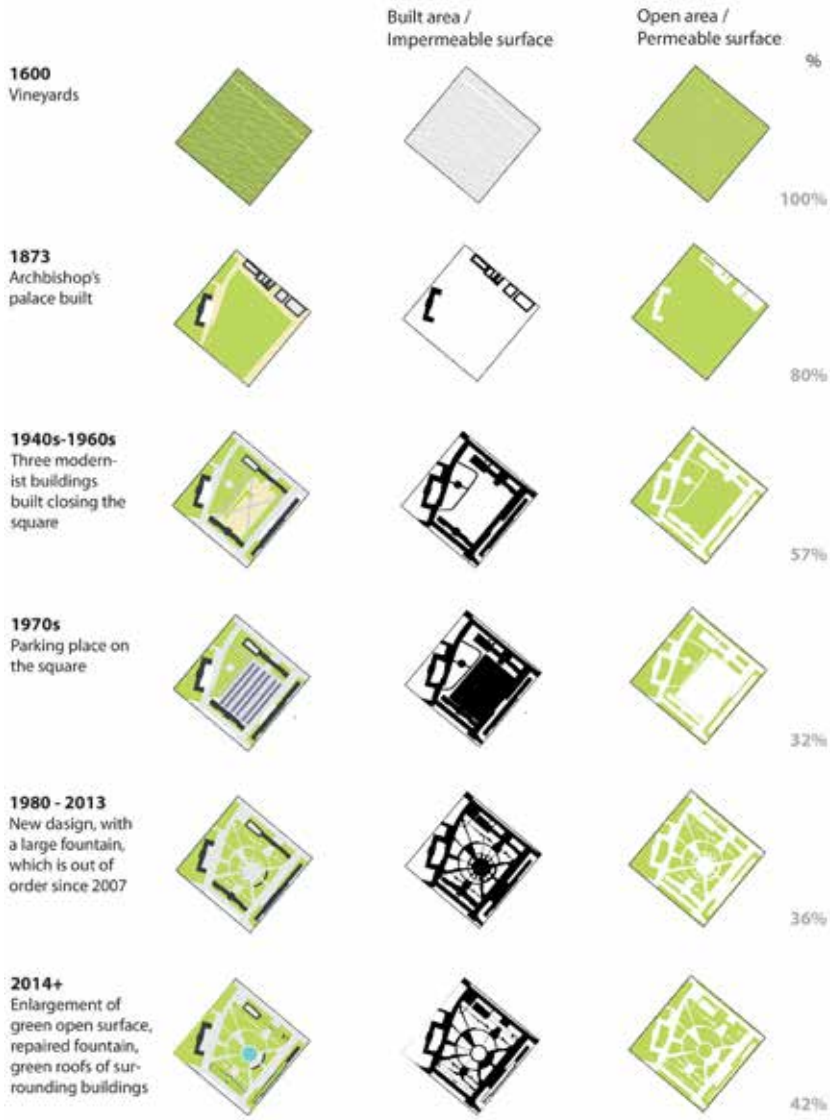
The most obvious method to introduce permeability is by opening sealed, non-porous surfaces in the city, adding new vegetation to support storm water collection and absorption, and to contribute to a cooling effect during the hot summer periods. In the Old Town, the open places with a permeable potential are the unused empty plots, parking lots, tram tracks and roofs of buildings. During the last two years, the first community gardens have been set up in Bratislava, on both public and private land. Many of them have been initiated by active citizens who have decided to take things into their own hands and to transform empty, unused voids in the city into a new public space for people, a permeable space allowing water absorption, as well as a green space offering shade and a cooling microclimate.

The city administration and the citizens have to realise that it is never too late to improve their urban environment, and the scale of the interventions into the existing urban fabric does not have to exceed a couple of m2. Where there is no space for larger green areas, a simple tree-bed instead of a parking place (Benepe, 2013) would be a solution to let storm water run-off or to be stored. Such green pockets can store about 10,000 litres of storm water (Image 11). Also, a fountain or public drinking water tap can improve the human comfort during hot summer days in the city. Many of the fountains in the Old Town of Bratislava are out of order due to lack of finances for their maintenance. Since 2007 this is the case of the largest fountain called "Unity" on the Freedom Square (Image 12), which is considered one of the most unpleasant public spaces in the in the city in the hot summer days[3]. This square went through a number of transformations in the last two centuries, covering up 64% of its surface with heat-radiating and non-permeable asphalt and concrete. With small scale interventions like collecting storm water into smartly enlarged existing green surfaces, forming volunteer groups for park management, maintenance and repairing the fountain with the help of local volunteer plumbers and engineers, the park will become not only more lively, but also a cooler public space (Image 13).



Towards a resourceful and responsible city

Such a paradigm shift does not mean less care by the city administration, but a partnership based on mutual responsibility and shared maintenance. It seems that every year the local municipality is cutting maintenance costs of public spaces, resulting in the transformation of green open surfaces into lower maintenance paved squares4 or demolished public elements or facilities such as fountains, pavement materials or benches. In the current economic situation and lack of finance, it would be good to remember unused and even renewable resource, both: climatological (such as storm



water, wind or sun energy) and social (sharing tools and skills). Establishing public-private partnership could offer a new strategy for the city as a step towards a more resilient and resourceful city. The city would save costs by collecting storm water (less load on the drainage system and stored water to be used for watering the parks in the hot summer months) and create attractive cooling urban spaces, by using existing resources - human capital and natural renewable resources. Public-private partnership between the city and citizens or local initiatives would create a platform where both parties would decide and be responsible for creating, protecting and maintaining urban open spaces by creating new permeable spaces, planting new and protecting existing trees or repairing existing public fountains and installing new drinking water taps in urban 'hot-spots'.

The notion of rediscovering and creating a relationship between the city and nature is strong in both the Old Town and Petralka. The Old Town has the potential to become more resourceful with new climatological processes, such as ecological storm water management and would create a cooler and more attractive urban environment for its citizens. Such solutions would also be more cost-effective, by putting less load on the drainage system and mobilising and letting people maintain and re-establish a relationship with their urban environment. Petralka is home to one third of Bratislava's population, offering an anonymous city-scape to anonymous city-dwellers. By re-creating, rediscovering and reconnecting with the social and natural components of the city, the living conditions of the city-dwellers will improve. Any ideas of citizens are welcome and allowed, provided they do not interfere with the permeable character and ecological processes of the area. Interventions can include a tree nursery becoming an urban forest, growing food or a sport area for children and adults.

After presenting the strengths and weaknesses of these two areas it is shown how both areas can benefit enormously from simple and smart environmental and social injections which help the city to become more resilient. However, such initiatives are not in the hands of "someone" or a centrally responsible institution, but in the hands of all those who want to live in a healthy and attractive urban environment.

1. http://petrzalka.otvorene.sk (Website only in Slovak, last accessed on July 24, 2013)
2. Approximately since 2011, Bratislava has experienced a growing number of engaging civic communities based on volunteering such as ' Zelena Hliadka' (a well-networked, active group of citizens cleanig up specific locations in Bratislava on a daily basis; http://www.zelenahliadka.blog.sme.sk) or 'Bratislavske dobrovolnicke centrum' (a community around the newly reopened Old Markethall, offering 'donation' of people's helping hands and skills; http://www.dobrovolnictvoba.sk).
3. Mapping urban comfort in Bratislava <http://urbanclimate.stadachtig.nl/mapping-urban-comfort-bratislava/>, author Veronika Kovacsova
4. An example of this is for instance the Main Square (Hlavne namestie) in the historical centre of Bratislava which till the 1980s used to be a green square covered partly with grass and paths.

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