

Towards Integrating Nature Based Solutions into City's Shape

– Case of Gothenburg Following COVID-19

Anna KACZOROWSKA, Chalmers University of Technology, Sweden

Abstract

The COVID-19 pandemic highlighted the role of good quality green space in urban areas, deficiencies in green space provision and accessibility. The concept of Nature-Based Solutions (NBS) is currently promoted in Sweden to provide simultaneous environmental, social and economic benefits, linked to ecosystem services (ES). Yet, there is an observed knowledge and methodological gap on the development links between the built and natural environment. This article aims to reflect on planning strategies for Gothenburg's green urban space. The main idea behind the research work presented in this paper is to investigate and explore possibilities to model and develop future integrated built and natural habitats that meet needs of everyday citizens. The results show a necessity to promote an approach of going beyond calculating accessibility to green areas but taking into consideration planning for qualities of urban green space in relation to city's shape and urban form.

Keywords

COVID-19, ecosystem services, nature-based solutions, urban design and planning

1. Introduction

Urban areas have become increasingly important for ecosystem services (ES) and biodiversity management as more than 50% of the world's population (UNDESA, 2018) and 70% of the European Union's population now lives in cities (The World Bank, 2021). Understanding the key trends in urbanization likely to unfold over the coming years is crucial to the implementation of the 2030 Agenda for Sustainable Development, including Sustainable Development Goal 11, to make cities and human settlements inclusive, safe, resilient, and sustainable. New Urban Agenda (2016), adopted at the United Nations Conference on Housing and Sustainable Urban Development (Habitat III) in Quito, Ecuador, on 20 October 2016, highlights the importance of creation and maintenance of well-connected and well-distributed networks of open, multipurpose, safe, inclusive, accessible, green and quality public spaces. Moreover, it calls to protect, conserve, restore and promote their ecosystems, natural habitats and biodiversity.

Urban areas are dynamic and complex landscapes, where urbanization effects on vegetation are influenced by socio-ecological processes across multiple scales (Ernstson et al., 2008). Further, the delivery of urban ES depends on the spatial structure of ecosystems (Alberti, 2005). The concept of Nature-Based Solutions (NBS) is promoted to better understand the role of urban nature and ecosystem services (ES) for human wellbeing. NBS are solutions to societal challenges that are cost-effective, can provide simultaneous environmental, social and economic benefits, and help to build resilience (Raymond et al., 2017). Urban densification can potentially promote the interest in planning with ES as a vital parameter for urban qualities. In situations of increasing competition for urban land



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and densification, it is essential to improve our understanding of the benefits of urban nature and how to balance such benefits against other development needs and pressures.

The COVID-19 pandemic triggered the great economic, financial and social shock of the 21st century, with over 100 countries having gone into lockdown (OECD, 2020). In comparison with the rest of Europe, Sweden has come through the pandemic relatively well, still it has constituted a serious crisis affecting the whole of society (The Corona Commission, 2022). Sweden adopted a ban on entry to the country in March 2020, ban on visits to residential care facilities for older people and a limit on the number of people attending public gatherings and events. The lockdown hasn't taken place, but an advice or recommendations were announced, which people were expected to follow voluntarily. Swedish citizens retained more of their personal freedom than in many other countries but home working, home schooling and social distancing became the norm. The social impact of the pandemic in cities like Gothenburg exposed a problem of not equal access of citizens to local green infrastructure. An access to 'nearby nature', such as urban parks, woodlands and forests were accessed for daily exercise supporting long-standing arguments that nature is important for physical and mental health. Smaller green areas in the city, such as allotment gardens, neighbourhood green areas or playgrounds, were visited on daily bases but due to distancing couldn't provide a space and activities for all. A "new appreciation of nature" reported widely in cities hasn't met the expectations of those living in dense urban areas. Implementation of NBS into the urban context used to be traditionally carried out in projects related to household plots (backyards, home gardens), community allotment gardens or utilization of empty parking spaces, buildings, roofs, along roadways or rights-of-way (Pearson et al., 2014). The weak integration between the built and natural environment became even more important today. The pandemic crisis provided an opportunity for city dwellers and planners to rethink drastically urban spaces taking better account of different needs and shifts from a logic of mobility to one of accessibility to basic public amenities and services (OECD, 2020). It highlighted a need to adapt urban design, reclaim public spaces for citizens, and rethink location of essential urban functions to ensure easier access to urban spaces and services while securing safety and health for their residents. It changed the urban paradigm and accelerated the shift towards inclusive, green, and smart cities.

This paper argues that we need to rethink modelling and developing integrated built and natural habitats to meet needs of everyday citizens in post COVID 19 Gothenburg. The examples from Gothenburg show necessity to strengthen connectedness between people in urban settings and their natural environment.

2. Gothenburg's Green Strategies

Gothenburg is a vibrant diverse multicultural city with new 85,000 inhabitants in the last 12 years, total population of 587 549 in 2021 and 28 % of foreign-born (City of Gothenburg, 2022). Rapid urbanization trends, and complexity of urban systems, ecological assessment of quality of "urban green" is an emerging prerequisite in Gothenburg's planning strategy due to ongoing rapid densification process. Environment and Climate Programme for the City of Gothenburg 2021–2030 adopted recently refers to setting goals for a green and resilient city. According to Programme Gothenburg there is a variety of species living within city boundaries and a proper management of green urban spaces can make an important contribution to biodiversity richness in Gothenburg. The challenge links to urban densification and growth. City needs to establish a methodology of planning urban development with management of biodiversity and the ecosystem services. One of the goals is to ensure access to green spaces in both residential area surroundings as well as parks and pre-school playgrounds to improve the physical and psychological well-being of people. This will require actions to improve the use, preservation, and development of ecosystem services in planning, construction, and management. There is a need to prioritize access to high quality green spaces while expanding and densifying the city.

The Master Plan for Gothenburg adopted in May 2022 serves as support policy document for detailed plans, building permits and decisions concerning the city's development or orientations and



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recommendations until year 2035. Regarding the city's need for the expansion of housing and workplaces, the overview horizon is until 2050. The ongoing projects to densify city blocks are concentrated in the Inner City (Centrum) and Middle City: Högsbo-Frölunda. Relatively many of the city's parks are in central Gothenburg but are relatively small. Larger nature and recreation areas are missing. This is partly due to the high density of buildings. Parks, nearby nature and blue corridors in central Gothenburg should be available and suffice inhabitants. Growing number of homes in the area of Middle City: Högsbo-Frölunda confirm an increased need for park and nature areas, playgrounds and outdoor environments, especially for families with children. There is a risk that target points and places that are currently used by children for leisure and play will be affected by the new development projects. It is therefore important, as the plan indicates, preserve the green park and nature areas that exist and ensure that no parks or natural areas in the already populated parts of the city are designated for other city functions. Green spaces that today are not considered to function for adults can be valuable and important for children. The plan also gives recommendations to create new district parks in the transformed areas, as well as supplementary areas where the development pressure on existing green areas increases.

Gothenburg's Green Plan (2022) for a close, cohesive, and robust city shows how Gothenburg can be strengthened as a city with large green qualities, from an ecological, social and economic perspective, along with continuing city development. The Green Plan serves as a decision and knowledge base for all stages in the coherent urban development process for years 2022-2030, providing an update and actualization of the Green Strategy (2014) and guidelines for planning accessible green areas. For example, residential parks or nature (at least 0.2 hectares) must be planned within 300 meters of walking distance from where people live, work and go to school. At the same time as larger parks or natural areas (at least 2 hectares), with a variety of social functions and ecosystem services must be planned within one kilometre. It is important to create new recreation spaces in the neighbourhoods where the pressure on existing parks is already high and locate new parks, with clear entrance, connecting to pedestrian mobility, public transport and important public structures.

The city is now facing new opportunities and challenges connected to urban development projects. The Green Plan is an updated steering document for the City of Gothenburg that covers green strategies from planning to implementation and management. It refers to EU strategy for biodiversity as a long-term plan to protect nature and stop the depletion of urban ecosystems, as well as to strengthen society after the COVID-19 pandemic as well as cope with future threats, such as climate change, forest fires, food shortages and outbreaks.

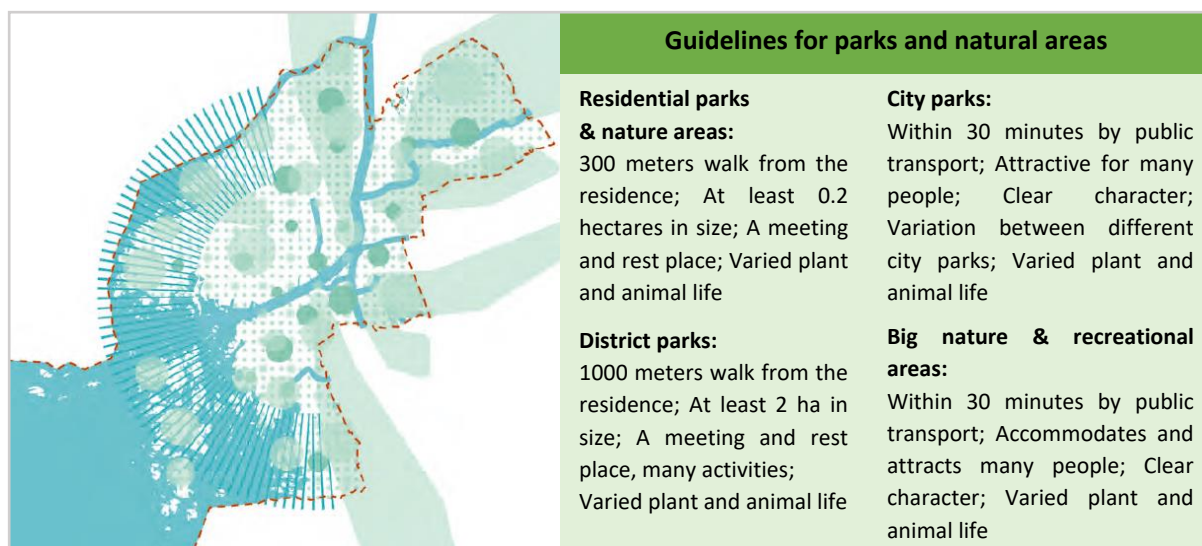
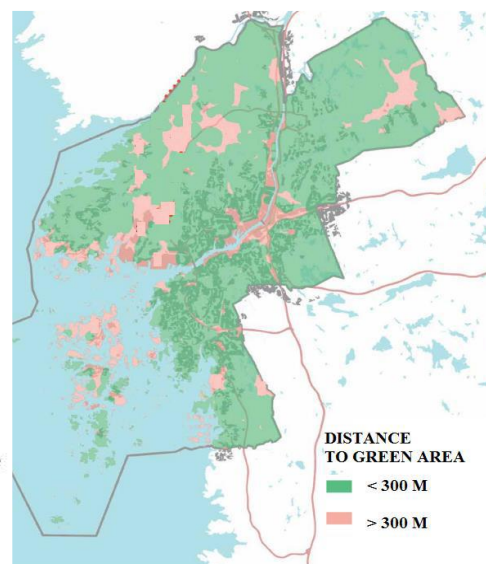
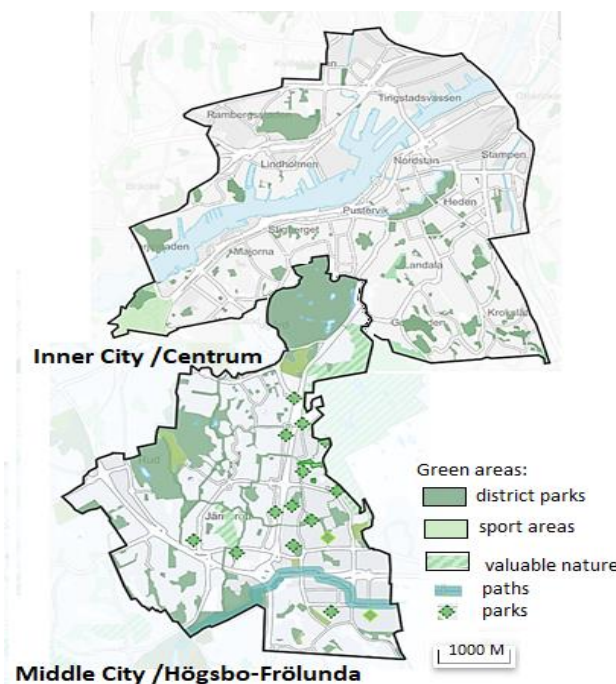


Figure 1. The strategic map of Gothenburg's Green Plan with overall green city structure and Guidelines for parks and natural areas (Gothenburg's Green Plan, 2022)

Three important documents: Climate Programme for the City of Gothenburg 2021–2030, The Master Plan for Gothenburg (2022) and Gothenburg's Green Plan (2022) have been adopted recently. The policy of Gothenburg City regarding nature, parks and blue areas correspond to the need of safeguarding their qualities along with city development strategies and represent "business as usual". They don't provide neither direct guidelines how to plan green areas and access to them after the Pandemic, how to collect observations about the lessons learnt, nor what aspects need to be discussed in the city on the more detail level by decision makers together with citizens. Regarding the city's need for the expansion of housing and workplaces, it is interesting in this paper to study more closer two areas highlighted in the Gothenburg's Master Plan (2022): the Inner City (Centrum) and Middle City Högsbo-Frölunda area. Parks, green and blue spaces, like other public spaces, support urban structures (figure 2). These green areas contribute to value -creating in urban development as well as to quality of life and well -being. According to Gothenburg's Green Strategy (2014) there is a need to build more district parks or gardens in areas where distance to nearest green areas extends 300 metres (figure 3).



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Figure 2. Green structure with bigger parks and natural areas in the Inner City /Centrum/ and Högsbo-Frölunda (Gothenburg's Master Plan, 2022)

Figure 3. Gothenburg's green corridors and accessibility to green areas with "< "or ">"300m (Gothenburg's Green Strategy, 2014)

pressure on green and open space in Gothenburg increases due to development of new residential areas and growing number of residents. There is a need to connect better central Gothenburg with larger parks and nature areas such as the Delsjö area, Änggårdssbergen and Hisingsparken for walking or cycling (Master Plan, 2022). Even if, Gothenburg promotes sustainable mobility especially in central Gothenburg, there is a growing importance of forming a coherent green structure for longer walks, running and similar activities that contributes to both city life and health and well -being. Existing parks and nature are safeguarded, if the connections between them is strengthened, and new parks built. The question remain how the municipality can fulfil the ambition to develop a greener city? How green residential areas in the city centre can offer programme for everyday activities for growing number of citizens, if the open and free spaces are shrinking? The same question remains in Högsbo-Frölunda, even if there are more green

and blue spaces than in the Inner City. In the western part of the district there are many parks and nature areas. The eastern parts are characterized by industry, where existing open areas can be designed as a new green structure.

The quality of green spaces in the city districts and programme needs to be enhanced. This is due to changing paradigm in which we live and work and different needs. It is worth mentioning that Swedes are known for having access to second home in their summer locations. The recent Pandemic revealed that part of Gothenburg's citizens could leave the city and work from home close to nature in family summer houses. It was not possible for low-income population not owning a summer place or families with children attending kindergartens and schools. Following travel restriction due to COVID-19 pandemic, or raising prices for private and public transport, suggest that staying in the neighbourhood area, is a reasonable option to choose. There is a question how new urban paradigm (not much discussed in the city strategic documents) and shift from a logic of mobility to one of accessibility to basic public amenities and services can influence design solutions for resilient green spaces in the city like Gothenburg?

3. COVID-19 and Urban Green

“Research shows that the risk of developing serious COVID-19 and of dying as a result of the disease was particularly high among people born outside Sweden, even when socio-economic, demographic and medical factors are taken into account. The risk decreased during the second and third waves but was still



Figure 4. A map of Gothenburg's areas after Folkhälsomyndigheten (author: A. Kaczorowska)

remarkably high” (The Corona Commission, 2022). The impact of COVID-19 pandemic varied in different parts of Gothenburg. The method used in this study was to analyse governmental open-source statistic data available for city districts (figure 4) related to number of people tested positive during the pandemic, use of space and well-being. The examination of data collected in the study between week 1 in 2019 and week 35 in 2021 (figure 5) showed that districts like Angered, Östra Göteborg, Västra Hisingen were characterised by the highest number of foreign-born population (%) but not the highest number of tested positive for COVID-19 (Folkhälsomyndigheten, 2021). The highest number of tested positive for COVID-19 (counted per 10.000 inhabitants) were noticed in districts: Majorna-Linne, Ögryte-Härlanda, Askim-Frölunda-Högsbo. The least number of owned cars were registered in two districts: Centrum, Majorna-Linne, and Östra Göteborg. The number of average paid sick days per district in 2020 was related to

all types of diseases, including COVID-19 and was the highest for Östra Göteborg, Angered and Majorna-Linne. Results show that districts with the least number of cars like Majorna-Linne, Centrum and Östra Göteborg are interesting places to study further with regards to accessibility to green areas and well-being. In the city policy documents it was highlighted that districts: Majorna-Linne, Centrum are planned to be densified further, and this will put more development pressures on existing green and open areas. Districts Högsbo-Frölunda and Askim figured as one big area with common statistic data. Askim represent a different urban character than Västra Frölunda and Högsbo (more single-family houses with gardens) and much lower density.

The impacts of COVID-19 pandemic on urban park visitation in Sweden did not significantly change during the pandemic as it could be connected to less restrictions on visiting public spaces, restaurants, and bars in Sweden (Geng et al., 2020).

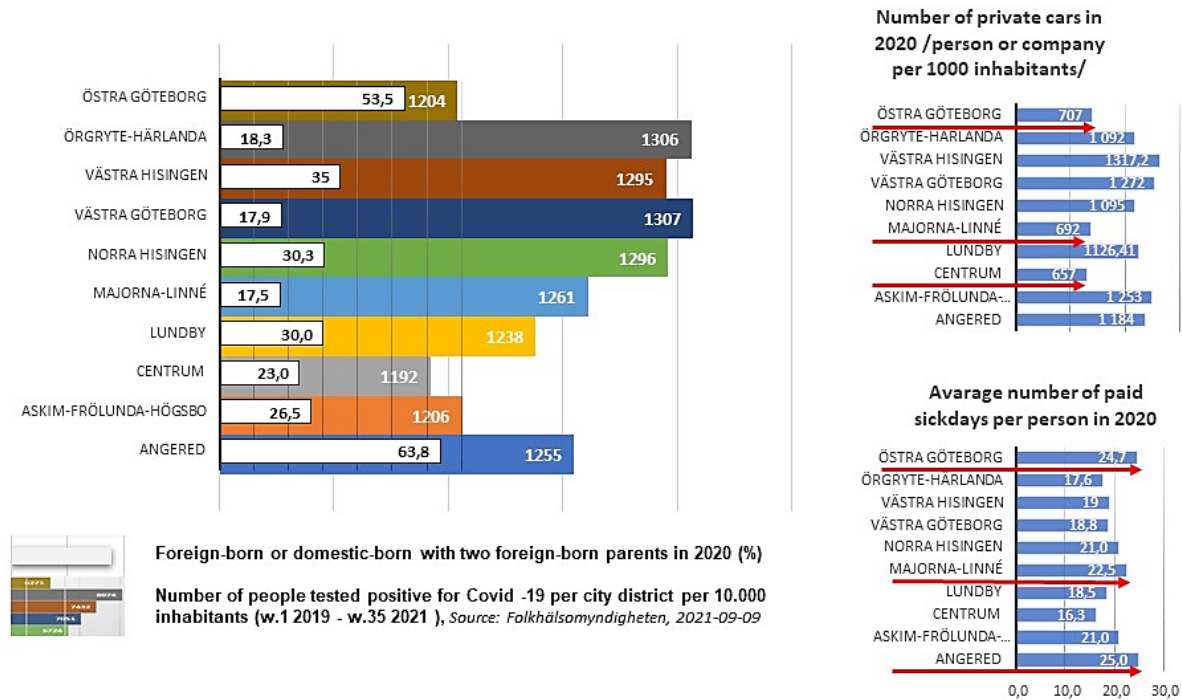


Figure 5. Visualisation of data in relation to people tested positive for Covid -19 per 10.000 inhabitants /w.1 2019 - w.35 2021/ and foreign born (%), number of private cars per 1.000 inhabitants and average number of sick days in Gothenburg's district, per person in 2020 (Folkhälsomyndigheten, 2021-09-09)

4. Integration of Nature Based Solutions into the City's Shape

The concept of Nature-based solutions (NBS) has been introduced by the European Commission in 2015 (European Commission, 2021). It serves as an umbrella concept bridging across multiple different ecologically designed and driven solutions that are "inspired and supported by nature, which are cost-effective, simultaneously provide environmental, social and economic benefits and help build resilience". NBS need to benefit biodiversity and support the delivery of a range of ecosystem services as solutions.

The COVID-19 pandemic highlighted the deficiencies in green space provision and accessibility in urban areas. The concept of Nature-Based Solutions (NBS) is currently promoted to provide simultaneous environmental, social and economic benefits, linked to ecosystem services (ES). Yet, there is an observed knowledge and methodological gap on the development links between the built and natural environment. NBS are solutions to societal challenges that are cost-effective, can provide simultaneous environmental, social and economic benefits, and help to build resilience (Raymond et al., 2017). In situations of increasing competition for urban land and densification, it is essential to improve our understanding of the benefits of urban nature and how to balance such benefits against other development needs and pressures.

Best practices and projects show that there are possibilities to model and develop integrated built and natural habitats that meet needs of everyday citizens (European Commission, 2021). This requires changing the urban paradigm in which we plan and build urban areas. It is important to enhance biodiversity of natural habitats and strengthen connectedness between people in urban settings and their natural environment. A simplified equation illustrates important factors for implementing NBS:

Planning, Construction, Management + NBS + High Biodiversity Index = Integrated Resilient Urban Habitats

Another important aspect revealed during COVID-19 pandemic is a need for spaces of isolation. People needed to keep distance to each other, and public spaces were often too crowded. This may be the argument to integrate NBS with semi-private and private urban spaces in the future. Figure 6 shows the example of urban farming in Västra Frölunda, a “bottom up” initiative started before COVID-19 pandemic. In terms of access to green area this initiative provides recreation possibilities to inhabitants interested in food production, allows harvesting storm water, enhances well-being, strengthens local biodiversity and habitat for species.



Figure 6. Example of different use of green spaces in Västra Frölunda, Gothenburg - NBS and urban farming next to the building at Rundradiogatan 12 (on the left), and a lawn (on the right) next to the similar building on the Rundradiogatan 14 (photos: A. Kaczorowska)

5. Discussion and Conclusions

The COVID-19 pandemic has constituted a crisis affecting the whole society in Sweden but its impact on urban park visitation did not significantly change during the pandemic. This study highlighted the importance of green infrastructure in cities, as well as more functional urban planning and design.

Moreover, there is an observed shift from a paradigm of mobility towards strengthening local public amenities, including building and maintenance of well-connected and well-distributed networks of open, multipurpose, safe, inclusive, accessible, green public spaces. The study of Gothenburg districts showed that the area of the Inner City and Middle City Högsbo-Frölunda (Gothenburg's Master Plan, 2022) are interesting to study further, monitor and enhance the quality of green infrastructure due to growing number of residents and planning new housing areas. Furthermore, the study revealed the necessity to focus on access to public green areas and health and well-being in the Inner City districts: Majorna-Linne, Centrum, Östra Göteborg due to high urbanisation pressures, limited access to green areas and parks within 300 meters; lowest number of private cars per person or company and high dependence on public transport, cycling and walking.

The results show a necessity to promote an approach of going beyond calculating accessibility to green areas, but also taking into consideration planning for qualities of urban green space in relation to city's shape and urban form. The examples of implementing green strategies and NBS in Gothenburg show that calculating distance to green area from the residential dwelling is not enough. The quality of “urban green” matters in terms of how the place is perceived by visiting citizens. Another challenge is to maintain the quality of green places on the neighbourhood level. Often these places have the potential to attract city's residents to enjoy nature, relax but are not welcoming or safe. Moreover, to look further at the quality of “urban green” is to plan for its biodiversity. This aspect is connected to district, city and regional planning and maintenance to enhance and develop green corridors as habitats for species.

There is an expressed need for long term perspectives in planning with new tools and methods for assessing values and benefits associated with urban green space.

Nature Based Solutions address many societal challenges (European Commission, 2021). They can be significantly important to support and enhance: green space management, place regeneration, knowledge and social capacity building for sustainable urban transformation, participatory planning and governance, social justice and social cohesion, and health and well-being,

Another challenge remains a knowledge gap on NBS and lacking methodology, tools to assess green areas along with a high gradient of urbanisation. Ways forward to overcome this challenge need to consider first a mapping of existing knowledge, training and building city development portfolio. There is a need for a collaborative and inter-disciplinary training however needs to acquire different types of knowledge (Smith & Hairstans, 2017). There is much explicit knowledge found in codes, publications embedded within people and organizations. Still, the majority of knowledge regarding built environment, including construction, is tacit or implicit. Explicit knowledge is relatively easy to disseminate. On the contrary, tacit knowledge is difficult to transfer by means of writing or speaking. It is embedded in people, societies, and cultures. It comes from experience, thinking, competence and commitment.

This paper suggest that front-runner cities create locally integrated implementation of NBS. Therefore, it is necessary to develop local collaboration and frequently engage stakeholders and communicate co-benefits, include NBS in education, professional training, decision making and implementation.

6. References

Alberti M. (2005) *The effects of urban patterns on ecosystem functions*. International Regional Science Review 28(2) 168–192.

City of Gothenburg (2022) *Statistics and Analysis*. <https://goteborg.se/wps/portal/enhetssida/statistik-och-analys> (15.09.2022).

Ernstson H, Sorlin S, Elmqvist T. (2008) *Social management and ecosystem services – the role of social network structure in protecting and managing urban green areas in Stockholm*. Ecology and Society 13(2) art. 39.

European Commission (2021) *Evaluating the impact of nature-based solutions: a handbook for practitioners*. Directorate-General for Research and Innovation, Publications Office. <https://data.europa.eu/doi/10.2777/244577> (15.09.2022).

European Commission, Directorate-General for Research and Innovation (2022) *The vital role of nature-based solutions in a nature positive economy*, Publications Office of the European Union. <https://data.europa.eu/doi/10.2777/307761> (15.09.2022).

European Environment Agency, Castellari, S., Zandersen, M., Davis, M., et al. (2021) *Nature-based solutions in Europe policy, knowledge and practice for climate change adaptation and disaster risk reduction*. Publications Office, <https://data.europa.eu/doi/10.2800/919315> (15.09.2022).

Geng D., Innes, J., Wu, W., Wang, G. (2020) *Impacts of COVID-19 pandemic on urban park visitation: a global analysis*. Springer.

Gothenburg's Green Plan. (2022) *Göteborgs grönplan för en nära, sammanhållen och robust stad 2022-2030*. City of Gothenburg.

Gothenburg's Green Strategy (2022) City of Gothenburg.

Gothenburg's Master Plan (2022) City of Gothenburg. <https://oversiktsplan.goteborg.se/> (2022-09-15).

Folkhälsomyndigheten (2021) <https://www.folkhalsomyndigheten.se> (15.09.2022).



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OECD (2020) *Nature-based solutions for adapting to water-related climate risks*. OECD Environment Policy Papers. OECD Publishing. <https://www.oecd.org/environment/nature-based-solutions-for-adapting-to-water-related-climate-risks-2257873d-en.htm> (15.09.2022).

Pearson L J, Newton P W, Roberts P. (2014) *Resilient Sustainable Cities*. A Future. Routledge.

Raymond CM, Berry P, Breil M, Nita MR, Kabisch N, de Bel M, Enzi V, Frantzeskaki N, Geneletti D, Cardinaletti M, Lovinger L, Basnou C, Monteiro A, Robrecht H, Sgrigna, G, Munari L and Calfapietra C. (2017) *An Impact Evaluation Framework to Support Planning and Evaluation of Nature-based Solutions Projects*. Report prepared by the EKLIPSE Expert Working Group on Nature-based Solutions to Promote Climate Resilience in Urban Areas. Centre for Ecology & Hydrology, Wallingford, United Kingdom.

Smith, R., E., Hairstans, R. (2017) *Built environment epistemology: knowledge exchange through university-industry communities of practice*. Computer Science. https://www.brikbase.org/sites/default/files/ARCC2017_Session3A_Smith_Hairstans.pdf (15.09.2022).

The Corona Commission (2022) *Slutbetänkande SOU 2022:10*. <https://coronakommissionen.com/publikationer/slutbetankande-sou-2022-10/> (15.09.2022).

The New Urban Agenda (2016) <https://habitat3.org/the-new-urban-agenda/> (15.09.2022).

The World Bank (2021) World Development Report 2021: DATA FOR BETTER LIVES. <https://www.worldbank.org/en/publication/wdr2021> (15.09.2022).

United Nations, Department of Economic and Social Affairs, Population Division (2018). *The World's Cities in 2018—Data Booklet* (ST/ESA/SER.A/417).