



Livability of Urban Public Spaces in Northern Swedish Cities: The Case of Umeå

Federico Costamagna, Rebecka Lind & Olof Stjernström

To cite this article: Federico Costamagna, Rebecka Lind & Olof Stjernström (2019) Livability of Urban Public Spaces in Northern Swedish Cities: The Case of Umeå, Planning Practice & Research, 34:2, 131-148, DOI: [10.1080/02697459.2018.1548215](https://doi.org/10.1080/02697459.2018.1548215)

To link to this article: <https://doi.org/10.1080/02697459.2018.1548215>



© 2018 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group.



Published online: 26 Dec 2018.



Submit your article to this journal [↗](#)



Article views: 208



View Crossmark data [↗](#)

Livability of Urban Public Spaces in Northern Swedish Cities: The Case of Umeå

Federico Costamagna^a, Rebecka Lind^a and Olof Stjernström ^{a,b}

^aDepartment of Geography and Economic History, Umeå University, Umeå, Sweden; ^bFaculty of Social Sciences, Nord University, Steinkjer, Norway

ABSTRACT

This study explores how winter conditions are taken into account in urban planning in the city of Umeå in northern Sweden. Snow and harsh winter conditions are to some extent considered in urban planning in most northern towns in Sweden. Besides that, snow and ice could also be elements in the city attracting people and contribute to the design of public spaces. Current plans and interviews with planners were complemented with participatory observations. The results show that public spaces designed for both winter and summer seasons are preferred.

KEYWORDS

Winter planning; urban accessibility; public spaces

Introduction

The urban planning model – the form and function of the city – is more or less universal. The Renaissance city, with its basic elements such as streets, blocks, squares and public buildings, can be found in most cities (Hall, 2002; LeGates & Stout, 2015). Over the centuries, the urban form has changed; in its current form it is less strict than the older cities, but overall it is still a matter of the same elements organized in space, with some variations. The city is not only about physical structure; it is also, as Jane Jacobs pointed out 55 years ago, very much about social life and social content, the relationship between individuals as well as between individuals and the physical structure, and the importance of spaces for public activities and interaction. The city is also a way of organizing social life and balancing private interests with the public interest (Hall, 2002; Jacobs, 1961).

The universal form of the city, particularly in its stricter Renaissance structure, has attracted a great deal of attention (Hall, 2002) in general, and the city space as a place for social interaction in particular (Harvey, 1992; Hall, 2002). Less attention has been paid to local conditions such as topography and climate. Of course, street life and public space activities vary in relation to local conditions such as altitude, climate, humidity, etc. Also, buildings can be equipped differently in relation to climate conditions. However, despite this adaptation to local conditions, cities around the world have much more in common than not. Their basic structure is the same, as is the relationship between public and private urban space. However, it seems obvious that a Mediterranean climate enables a social street life to an extent that is not possible in

CONTACT Olof Stjernström  olof.a.stjernstrom@nord.no

© 2018 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group. This is an Open Access article distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives License (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited, and is not altered, transformed, or built upon in any way.

the European North. There are local adaptations, such as in Kiruna in northern Sweden, which is located on a mountain slope, which offers milder temperatures during the winter, and whose street pattern follows a topography (curved and bent streets) that offers wind protection and variation. Still, in its central parts the northern city often echoes the Renaissance days with a regular street pattern and open places, which to some extent is poorly adapted to the city's climate and location.

Therefore, this article aims to explore and analyze the northern/arctic urban planning/form/social life, how the urban physical form interacts with the urban social life in northern cities, and whether the harsh climate has had any impact on the urban planning departing from the case of Umeå. Urban life in a northern/subarctic context is one perspective that has been under-researched in a field that historically focussed more on life in cities in a temperate/Mediterranean climate, or during snow-free seasons.

Umeå in the northern part of Sweden is used as a case to investigate the relation between urban structure and the use of public spaces during the winter season. Umeå was chosen as an example as it is the largest town in northern Sweden (Norrland), with a growing population in a region that is generally associated with depopulation. City planning is therefore a central issue with the municipality, with many densification projects in order to make distances shorter and promote non-fossil means of transportation, such as bike-riding and walking. Historically, Umeå also has other cases of planning for a climate other than its own, with the architecture of the university campus taking its inspiration from campuses in California and Denmark (Westin, 1990), only to be complemented with skywalks between buildings for the colder seasons when walking outdoors becomes inconvenient. We are of the opinion that, for future development, the northern climate should be taken more into consideration in the planning process.

The following research questions are addressed:

- How does urban planning relate to outdoor urban public spaces in cities with a harsh winter climate?
- Is it possible to make outdoor urban public spaces more livable during the winter?
- Does Umeå municipality use any winter-specific approach in urban planning and the design of public spaces?

Methodology

The methodology used in this article is both theoretical and empirical. The theoretical part is based on a literature review and a selection of previous studies on public spaces and urban design, and how the climate affects both. The literature review has been carried out in two different phases: a first general exploratory phase looking for urban public spaces and urban planning and a second phase based on specific research criteria related to the article's topic. In the first phase no age or geographical limits were put for the resources found, but only the relevance of the topic was considered. The second phase instead limited the research to article related to the topic of climate and weather in urban studies and public spaces and also restricted the geographical area of case studies to Canada, Russia, Scotland, north Japan and Scandinavia. The literature review showed that the literature contains numerous and different studies, books and articles on urban planning and design in general, few of them focus on public spaces; and there is even less literature

on the climate's effect on public spaces. The articles that do deal with climate in relation to public spaces mainly refer to scientific studies to show how the climate affects people's personal wellbeing outside, but in only a few cases do they analyze how to deal with this and how to properly design outdoor urban public spaces in order to avoid climatic discomfort. In order to analyze, the solutions already studied and applied in winter cities like Umeå, we relied on case studies on cities in Canada and Sweden that have already enacted a number of solutions in urban planning for the winter. The empirical part, focused on Umeå in northern Sweden, consists of an analysis of the city's urban planning procedures and relies on interviews with urban planners and architects as well as an analysis of the ongoing project of renovating the city's central square (*Rådhusorget*) and of the direct experience of the city. During our interviews with architects, planners and municipal employees about public spaces in general, as well as specific places in the city, many considerations arose. The interviews were semi-structured and applied to a scheme of open questions with a defined theme (the livability of Umeå public spaces during the winter, the use of public spaces during the winter, and how people experiences public spaces in the winter). The interviews took place on site, at the municipality building, and at a distance via email. These interviews were supplemented with on-site interviews with random visitors in a number of public spaces in Umeå (*Tegsplan*, *Mariehem center* and *Nornaplatsen*). A total of three city employees and one architect were interviewed: two employees from Umeå's planning office, one employee from Umeå's streets and gardens office, and the head architect of *Rådhusorget*. The interviews lasted 30 min to an hour, and notes were taken during this time. The 93 on-site surveys were much shorter (normally 5–10 min), and complemented with observations of individual activities on the observed public spaces, how visitors used the space and how they moved in it. These observations were carried out for 10 min every 90 min between 8 a.m. and 8 p.m. over 2 week days, and between 8 a.m. and 3.30 p.m. 1 Saturday or Sunday, for each space. Approximately 30 short interviews were made at each location. The interviewees were selected with a degree of stratification regarding sex and age. They were approached at different times of the day and were asked about their usual activities at the site, their general opinions on its layout and services, and the frequency of their visits. They were also asked to rate their feelings of safety; the usability of the space; how well the space serves its purpose; attractiveness of the space; feelings of attachment; and accessibility, both physical and perceived. This material provided a basis for analyzing the main use of the space as well as the degree of, and reasons for, emotional ties to the space in its users. Comments from the respondents also gave some indications as to which specific aspects of the space were appreciated by its users, and which were not.

Previous Studies

A public space is a place that is characterized by a collective social use and is freely accessible and usable by everyone. Such spaces can be either indoors or outdoors, and may include walkways, parks and other open areas like public squares, public building lobbies and various other areas where people can sit, gather or pass through. It is important to note that the term *public space* can be applied to a wide variety of social environments, from urban streets and sidewalks, to suburban shopping malls and movie theaters, to the public forums and chat rooms of the Internet (Borja & Muxí, 2001).

Public space has been discussed and analyzed within different perspectives and disciplines. Architects and urban planners take an interest in public space and its physical characteristics in order to study the relationship between physical space and people; urban sociologists consider public space in the context of social relations; and geographers and political scientists are concerned with the role of public space in civil society context and in the exercise of democracy. From a socio-cultural perspective, public spaces are defined as places of interrelation, social encounter and exchange, where groups with different interests converge (Borja & Muxí, 2001). Spaces that can be accessed by everyone provide a setting for spontaneous meetings, and even brief contact such as recognizing each other's presence, or recognizing each other by sight, can help strengthen the social fabric of a community as well as broaden individuals' perspectives (e.g. Arendt, 1958; Jacobs, 1961; Dempsey *et al.*, 2011). The presence of inclusive public spaces that accommodate the needs of a multitude of people, who may not otherwise cross paths in their daily lives, is therefore essential to a rich public life and an integrative society. The social value of urban public spaces makes them significant within cities as they are involved with people's needs, from the very basic to the complex. This setting is the basis for our life outside the private sphere, and the extent to which different activities and behaviors are allowed or restricted there is reflective of the extent of liberty or oppression in a society at large. As such, public spaces affect people's quality of life. An important notion in Western thought about public space is that of an unrestrained public sphere where social and political movements can occur (Mitchell, 1995). Therefore, from a political perspective, any definition should include a vision of public spaces as places where people can participate in public life and where their claims can be voiced (Lopez de Lucio, 2000). As it is recognized as an important stage for political action, scholars relate the quality of public spaces to the quality of democracy (Marcuse, 2014). Finally, the architectural perspective defines public spaces based on their physical aspects and their relationship to the surrounding buildings as well as the entire city. Public spaces are artificially constructed places that are open and accessible to everyone, in contrast to private spaces, where access is controlled and restricted.

Public spaces can be distinguished by issues of ownership, control and access. They are generally publicly owned by the municipality or other public bodies, but not all publicly owned spaces are freely accessible to everyone. On the other hand, some privately owned spaces, like commercial galleries and building lobbies, are accessible to the public and could hence be defined as public space, although access in these cases is usually restricted to opening hours, or by what type of activities are encouraged or prohibited. Shopping galleries, for instance, rely on trade and consumption as the basis for their existence, and are therefore not unconditionally public in essence. Some authors define public space as, for instance, the 'space that is not controlled by private individuals or organizations, and hence is open to the general public' (Madanipour, 1996, p. 144). Others base their definitions on issues of access and use, with public space defined as, for example, 'publicly accessible places where people go for group or individual activities' (Carr *et al.*, 1992, p. 50). These different definitions attribute varying degrees of accessibility to the concept of 'public'.

Almost all definitions of and views about public space include the primary indicators of accessibility and activity, stating that urban public space is an area that is accessible to all people and is the setting for their activities. Although public space generally refers to an open space with no restriction to access, this is not always true as accessibility can

vary from one place to another. Due to cultural, social, political and economic aspects, the access to public spaces can be restricted or denied to certain categories of people or during certain hours. Even when public space is completely accessible to all, certain user groups tend to discourage others; thus, scholars agree that unconditional universal access to public space is virtually impossible (Mehta, 2014, p. 54). Political theorist Iris Young offers a normative ideal of publicly accessible space: that successful spaces must be universally accessible, and must contribute to democratic inclusion by encouraging interaction between acquaintances and strangers (Young, 2000). Such ideal spaces serve as 'the material location where social interactions and public activities of all members of the public occur' (Mitchell, 2003, p. 131. However, this vision is utopian, as the ideal of a universally inclusive and unmediated space can never be met (2003).

Another distinction in defining public space can arise from its different uses. The use and appropriation of public spaces is a fundamental issue that has to be considered in any study of the daily lives of city dwellers. However, it is an experience that is not the same for everyone, since age, sex, social class and ethnic identity affect the way urban life is lived and perceived (Garcia-Ramon *et al.*, 2004). Today, some of the historical uses of the public space, such as commerce, communication and entertainment, are mostly privatized. Nevertheless, the public space remains an essential arena for citizens' wellbeing as it allows them to express their social, political and cultural needs. In public spaces people regularly meet other people, participate in political demonstration, rest, and relax. Thomas (1991) highlighted the social role of public space and suggested 'that public space is an essential arena which provides opportunities for individuals and communities to develop and enrich their lives' (Thomas, 1991, p. 222). He identified four social roles for public space:

- (1) as an arena for public life;
- (2) as a meeting place for different social groups;
- (3) as a space for the display of symbols and images in society; and
- (4) as part of the communication system between urban activities (p. 210).

Even if public spaces today have lost some of their original roles, they are still important. There is a growing belief that while modern urban societies no longer depend on the town square or the piazza for basic needs, good public space is required for the social and psychological health of modern communities (Poppink cited in Cooper Marcus & Francis, 1998).

Public spaces hold multiple and varied meanings, depending on people's daily activities. So, what are the qualities and characteristics that define a (good) public space? Carr *et al.* (1992) offer a holistic and comprehensive description, suggesting that ideal public space is responsive, democratic and meaningful. The Project for Public Spaces (PPS), an American organization based on the work of William H. Whyte, describes successful, or high-quality, spaces as those that address issues of accessibility, activity and use, comfort and image and sociability. That is, they are easy to access and are connected to the surrounding community; contain a range of activities for a variety of users; feel safe, clean and attractive, and have adequate seating; and, most importantly, act as venues for people to interact socially (Project for Public Spaces, 2008).

Safety is often cited as one of the main concerns regarding public spaces. In fact, safety highly affects the use of a public space and its accessibility. Several environmental characteristics affect the safety of public space; regardless, it is safety perception that plays a significant role in making places appear safe or unsafe to people. Empirical research shows that the sense of perceived safety from crime is affected by a space's physical condition and maintenance, configuration of spaces, types of land uses, the alterations and modifications made to the environment, and the presence or absence of, and type of, people (Mehta, 2014, p. 60). Hence, safety is a key attribute for a public space and there is a general consensus that 'perceptions and feelings of personal safety are prerequisites for a vital and viable city' (Oc & Tiesdell, 1999, p. 265).

Comfort, another key attribute, depends on numerous factors such as the perceived level of safety as regards the environment, the weather, and the place's physical conditions. Existing literature on the effects of environmental factors on human behavior shows that comfortable microclimatic conditions, including temperature, sunlight, shade and wind, are important in supporting outdoor activities in public spaces (Bosselmann *et al.*, 1984). Sunlight has been found to be a major attraction in the use of public open spaces (Whyte, 1980). In a study of 20 towns and cities, Hass-Klau *et al.* (1999) found that social activities occurred in places that had 'plenty of sunshine' and were protected from the wind. Physical characteristics that can contribute to comfort in public spaces include sitting space, other street furniture and physical artefacts, generous sidewalk width, trees, shade and shelter, a high degree of articulation with nooks, corners, small niches in adjacent walls and landscape elements such as ledges and planters, among other things (Cooper-Marcus, 1975; Whyte, 1980; Gehl, 1987; Hass-Klau *et al.*, 1999; Mehta, 2007). Gehl (2013) regards climate as playing a key role in determining city quality, pleasure and comfort, and stresses that most city planning makes no attempt to ensure the best possible natural climate quality in the city space.

Spatial quality is particularly important for public spaces. Humans feel comfortable in spaces with physical elements that can be related to the size of our bodies and body parts. Pleasure derived through a sensory experience of the public space depends on various stimuli perceived from the environment.

Lynch (1961, pp. 118–19) identifies vitality as one of the performance dimensions of urban design, describing it as the degree to which the form of places supports the functions, biological requirements and capabilities of human beings. Vitality deals with the degree to which an urban space is socially successful. In Montgomery's definition (1998), vitality refers to the number of people in and around the street (pedestrian flows) across different times of the day and night, the uptake of facilities, the number of cultural events and celebrations over the year, the presence of an active street life, and generally the extent to which a place feels alive or lively. Vitality in the urban realm is an important quality because it reduces crime, makes commercial interests more viable, increases passive enjoyment of the streetscape such as people-watching, encourages social interaction and provides opportunities for cultural exchange. Consequently, vitality in urban space is regarded as an important measure of its health. Strictly connected to the vitality term is the concept of a lively city, which Gehl (2013) defines as a city where increasingly more people are invited to walk, bike and stay in the city space.

What are Nordic Northern Cities?

The Nordic northern cities experience highly particular and harsh climatic conditions due to long winters with snow, ice, rain, wind, prolonged cold and darkness. The characteristics of winter in these regions can be summarized in the following points (Pressman, 2004, p. 5):

- temperature: normally below freezing;
- precipitation: often in the form of snow;
- limited hours of daylight and sunshine;
- extended periods of the factors listed above;
- strong seasonal variation.

These conditions place serious limitations on urban life, and massively affect the use of outdoor public spaces. So, in order to overcome this critical condition, the main goal of urban design should be to extend the outdoor season by encouraging people to remain outdoors while maximizing the beneficial aspects of winter and minimizing thermal discomfort (Pressman, 2004):

It doesn't matter the temperature, when the sun is shining and the wind is tame, it is a good day in Nordic countries.

Jan Gehl, Cities for People (2010)

As stated in the literature, the city's public realm – its streets, squares, parks, open spaces, lanes, boulevards, alleys, arcades, passages and skywalks – is a critical determinant of the quality of urban life. Several factors have been shown to influence people's perceptions and use of the outdoor environment, among them the design and function of the space, as well as the physiological and psychological parameters involved in human reactions to the physical environment (Eliasson *et al.*, 2007).

Climate and weather conditions are hence a crucial factor to consider in outdoor public spaces. In fact, the relationship between functional use and microclimatic conditions has been confirmed in several studies (e.g. Gehl, 1987; Westerberg, 1994; Nikolopoulou *et al.*, 2001; Zacharias *et al.*, 2001; Thorsson *et al.*, 2004), which show that comfortable weather conditions, i.e. warm temperature and access to sunlight, increase the number of people present in an urban space. Carmona *et al.* (2003) stresses the need for a 'climate-sensitive city design' that considers spaces' microclimate, which is a prerequisite for successful places. Moreover, weather parameters (clearness index, air temperature and wind) have a significant influence on participants' weather assessments and place-related perceptions, emotions and attendance (Eliasson *et al.*, 2007). A comfortable microclimate in urban spaces encourages people to spend time outdoors where they can meet other people and experience the city life, which is beneficial not only to people's personal wellbeing and social life but also to the local economy (Ebrahimabadi, 2015). Studies have demonstrated that thermal, and by implication also comfort conditions, affect people's use of outdoor spaces. Responses to the microclimate, while possibly unconscious, have resulted in a different use of urban space in different climatic conditions (Nikolopoulou *et al.*, 2001). Key factors in outdoor comfort are sun radiation, wind, ambient temperature, humidity, activity level and clothing

(Bosselman *et al.*, 1995). Urban design can influence the impact of climate factors: in his studies on urban outdoor comfort in cold climates, Ebrahimabadi (2015) stressed that three issues are crucial for improving environmental comfort in subarctic climates:

- provision of shelter from the wind;
- maximizing solar access;
- managing snow in the outdoor environment.

Wind is one of the crucial factors affecting the outdoor comfort and livability of public spaces. Wind speed is influenced by the city shape; in fact, tall, free-standing buildings and a lack of barriers, as well as a certain orientation of streets, can intensify the wind and create turbulence along the ground (Gehl, 2013; others); so, friction along the terrain is key in minimizing the effect of the wind (Gehl, 2013).

The winter comes not only with bad features, but also with opportunities related to the strong seasonal variation. Urban planning and design can use the abundance of ice and snow during the winter as an opportunity. When city rivers and ponds ice cover, they create new urban public spaces that can be used by citizens. In Luleå, Sweden, during the winter the municipality sets and manages new ‘ice streets and paths’ on the river and the sea, providing them with signs and directions and maintaining safety standards. People use them for walking, ice skating and kick-sledding.¹ Moreover, shelters with seats, wind barriers and fire spots are placed along the route to create meeting and resting places. Winter, with its snow and ice, also provides numerous opportunities for recreation, like winter festivals, winter sports and snow-related outdoor activities (Pressman, 2004). During the summer, the long days can be a booster for encouraging people to stay outside and ‘live the city’. However, these opportunities are not always sufficiently exploited in Nordic cities.

Nordic cities indeed require particular attention to the urban planning and design of public spaces. Urban space could be designed using microclimatic principles that block winter winds and allow sunlight to penetrate between buildings. There are specific climate considerations to be made when designing outdoor public spaces: the physical design of buildings for large amounts of snowfall, drainage systems for snowmelt and connections between places of work, leisure, commerce, residence, school and others. The ‘winter city’ movement has suggested principles for dealing with urban planning in the far north and at high altitudes (Pressman, 1996). Some potential strategies for approaching planning for this type of city involve ‘contact with nature, year-round usability, user participation, cultural continuity and the creation of microclimatic conditions throughout much of the city’s open spaces’ (Pressman, 1996, p. 521). The application of these principles can extend to the summer and marginal seasons, and even allow summer-type activities (e.g. sitting in the sun) to take place on mild winter days. By minimizing winter-induced discomfort (i.e. reducing wind chill, increasing exposure to the sun, and creating sun pockets) through improved microclimatic spatial interventions, longer use of public space and recreational facilities can be anticipated (Pressman & Lüttgen, 2002). For regions with climates similar to that of Oslo, Stockholm or Toronto, the number of outdoor days can be increased by up to 30% (Culjat & Erskine, 1988). Ebrahimabadi (2015) highlighted significant challenges for local planners: controlling the wind, using snow in the urban

environment, applying design to improve snow removal, controlling snow drifts and a generally low sun elevation and risk of overshadowing.

Gehl (2010) indicates that cities must be lively, safe, sustainable and healthy, but these are hard conditions to achieve in northern cities. Darkness, wind and cold weather affect livability and the feeling of safety. To improve quality of life in winter cities, it is therefore necessary to reduce inconvenience, offer protection from the excessive negative stressors associated with winter, and optimize exposure to its beneficial aspects. Public spaces are the places where most human social relations take place and are indeed particularly important for mental health in the winter due to isolation and other multiple stressors that impact people during the cold, dark season.

Despite all the knowledge about microclimatic conditions in public spaces and about planning in the north, there appears to be little application of climate knowledge in urban planning. In Sweden, for example, based on interviews with Swedish planners Eliasson (2000) identified several reasons for this, including a lack of knowledge and tools, policy issues such as unclear regulations, time constraints and other priorities in planning practices, and market orientation.

There does, however, seem to be an increasing trend in acknowledging the need to incorporate the winter climate into urban planning at for instance, Luleå University of technology. The reduced physical activity often associated with the cold and dark winter season leads to a decline in both physical and mental health. To come to terms with this problem and improve accessibility to the town's outdoor environment during the winter, a 'white plan' project is being developed in some Swedish municipalities as a complement to the 'green' and 'blue' plans (representing green areas and water) used during the snow-free season. A pilot study by Nilsson and Kostenius (2016) identified a need for developing outdoor areas for both activity as well as relaxation and sociability during the winter, and for improving lighting for safety reasons. While there are health risks connected to cold climates (slipping accidents, frostbite), the lack of physical activity is a much worse health issue and should be promoted year-round. When snow and ice cover the blue and green surfaces, new routes are formed, and alternative means of transport are motivated, encouraging a different use than in the summer months. The research team has identified a need for further research on the perceived difficulties and obstacles preventing people from engaging in outdoor activities in the winter, and to incorporate this knowledge in planning processes. Not only does this involve designing public spaces to promote physical activities – such as ice-skating rinks, etc. – but the transport routes used for daily commute matter a great deal: these can either promote or prevent seasonal changes in means of (non-motorized) transport. Improving the safety of winter transport routes is also of great benefit to society, keeping accidents at a minimum (Nilsson & Kostenius, 2016).

Gällivare municipality has also developed a green, blue, and white structure plan. The basic concept is to see each of these structures as an asset, and to find synergies between them in order to create social and spatial values. The project offers an advantage to pedestrians and cyclists in the snow-free season, providing them with wide and direct routes, while in the winter additional means of transport such as skis, kick-sleds and snowmobiles are promoted. Segments used for plantings and benches in the summer months are turned into transport routes in the winter, using snow cleared off the streets to prepare suitable ground structure for winter transport. These green

segments also have an additional function, facilitating water run-off. The project will be tested in full scale during the 2016/2017 winter season (Gällivare Municipality, 2016).

Moving outside Sweden, many of these ideas are also found in the winter city strategy of the Canadian city of Edmonton, Alberta. This is a highly ambitious plan, taking into consideration – in addition to soft transport infrastructure plans similar to those of Gällivare – architecture and landscaping in order to minimize winds and turbulence, and maximize exposure to sunlight, in order to create a more comfortable winter climate. There is also a focus on outdoor seating and cafés that are also able to be used in the winter, and shelters and huts where people can warm themselves in order to prolong a day of winter activities in the park (Winter City Edmonton, 2016).

Umeå and Its Climate

Umeå is medium-sized town located in northern Sweden and, with its population of 119,613 in 2015, is the largest city in the Norrland region. Umeå is a center of education, science, social science and medical research in Sweden, with two universities and over 39,000 students, and was named the European Capital of Culture of 2014. Actually, the city is growing, and new residential and commercial areas are being built to satisfy the municipality projection of reaching a population of 250,000 by 2050.

The city is located at 63°49'30"N 20°15'50"E and, according to the Köppen-Geiger climate classification, has a subarctic climate (Dfc). The average temperature is below zero from mid-November to mid-April, and the snow coverage typically lasts from November to the end of April, according to the currently defined normality, which is based on averages for the period 1961–1990. The average number of days with snow coverage is normally 150 a year (SMHI, 2014a). Recent winters have been milder, however, with the snow arriving a couple months later than usual, which is most likely an effect of climate change as well as normal variations. During mid-winter the day in Umeå is short – only four to five hours during December and January – but, on the contrary, the sun is up for 21 h a day in mid-June, which means 24 h of daylight (SMHI, 2017). The amount of sunshine thus varies greatly over the year, with only about 20 h for the entire month of December to as much as 300 h in June (SMHI, 2014b).

Result

The Use of Climate Knowledge in Designing Umeå's Public Spaces

Umeå's winter climate conditions affect the way citizens experience the public realm. The use of public spaces and transportation habits change over the different seasons, affecting inhabitants' quality of life. Considering the key role of climate in determining the quality, pleasure and comfort in city public spaces, a city that experiences a subarctic climate, like Umeå, should develop a systematic winter approach to designing and planning the city and its public spaces, in order to make them more livable during the winter.

The findings show us that the municipality does not have a systematic approach or specific guidelines for winter-related problems (and opportunities) for the design of city's public spaces.

According to the planning department in Umeå municipality, they do not have any specific programs or guidelines regarding the winter. However, the 'winter perspective' is already present in planning procedures and all plans, programs and guidelines. For example, in the comprehensive plan there are guidelines that dictate that the public space is to be designed to function year-round. The winter is also a significant issue in the municipal budget, partly because of keeping the roads clean from snow. The municipality also faces a challenge in reaching the goal of sustainable transport, through encouraging more people to bicycle during the winter as well. Another example is the renovation of *Broparken*, a park by the riverside, where stair banisters were designed to be used as snowboard rails in the winter and the gradient of the park was set to be used for sledding and skiing/snowboarding.

Employees from the city planning office said there was no specific winter policy; rather, the aspect of winter is well integrated and always present and discussed in planning and designing public environments in the city.

Winter transportation is one of the themes that emerged during the interviews with the planners in Umeå. The municipality estimates that 35% of Umeå's working population go to work by bicycle during the warmer months, but that during the winter this number decreases to 25%. In order to make it easier for bicyclists and safer for them to move around the city during the winter, the bicycle paths are the first to be cleaned from snow, even before the car lanes. Thus, the municipality actually has some policies in place to overcome winter-related problems in public and private transportation, but these are only related to the usual means of transport. Other city policies are not limited to minimizing the negative winter aspects, but also aim to enhance the positive ones and the new opportunities offered by the winter conditions. Alternative means of transport like skiing, kick-sledding and ice-skating are encouraged and supported in other municipalities. This is neglected in Umeå today, however, where sanding prevents vehicles other than bicycles and cars from using the streets and lanes. The kick-sled is a substitute for the bicycle in the winter, especially for the elderly and others who are uncomfortable cycling on slippery surfaces. Preparing transport routes solely for pedestrians or vehicles on wheels also prevents people from skiing to the ski track or pulling their children in a toboggan to a park or hillside: instead, the skis and toboggans need to be carried. This complicates common outdoor winter activities instead of promoting them and may result in increased car traffic due to logistics. A town aiming to consider all four seasons in its planning has to work actively to promote different activities in accordance with the seasonal changes and the corresponding variance in conditions. In Luleå, for example, every winter the municipality sets up ice roads on city rivers and lakes, providing them with signals and resting spots. Umeå municipality is without a doubt dealing with the problems of winter, but in a way is simply trying to override it without embracing it as an important (and long) time of the year. There are indeed many public environments designed for winter use in the city or in its periphery, among them a number of ice-skating rinks and prepared cross-country ski tracks, as well as a downhill ski slope near the city center (Umeå Municipality, 2017a, 2017b). While these recreational facilities are an important part of outdoor life, they serve a very

different purpose than the urban spaces we address in this article, where social encounters occur in people's daily life, on the way to or from work or other activities. Such spaces should not simply be limited to logistics come winter, but should remain pleasant and inviting year-round, providing a social arena within the urban context – without the prerequisite of consumption that shopping galleries present. Recreational public environments are a complement to, not a substitute for, urban public space.

The City Square – Rådhusorget

Rådhusorget is the main square of the city of Umeå. It hosts the old Town Hall, one of the main characteristic buildings in the city. The square also serves as a connection between the river (south) and the major commercial street. In 2015, the municipality decided to renew the square and started the process of defining a new design. The process involved citizens through interviews and was assigned to a design group headed by landscape architect Thorbjörn Andersson. According to the parks and streets office of Umeå municipality, winter conditions have been one of the main issues in the design of *Rådhusorget*. It is important for the municipality that all public spaces are attractive year-round, especially the city square.

Through official documents and the interview with the head architect of the project, we tried to analyze whether the new square had been adequately designed for winter and the cold Umeå climate, as well as how this had been accomplished. Our first observation is that there are very few references to winter in the documents for the new square design; it is seen as simply one of the four seasons, rather than the longest and dominant season in the city. The drawings and renderings showing the future square are, for example, set during the spring and summer, with a relevant presence of greenery and sunlight. This is quite a misleading representation, since the predominant color most of the year will be the white or gray of the snow or sleet, with no greenery or sunlight. Throughout the planning stages, it must be evidenced that the municipality has asked the architects to pay special attention to two aspects of winter, light and snow. The designers were told to emphasize artificial light as an effect, and also to work with snow and the snow ground cover. Another focus has been given to the sunlight exposure on the square. The designers have made shadow diagrams and placed a transparent 'Orangerie' as a back wall at the rear of the area, where they believe the most people will be, as this is the sunniest place on the square. The idea is to be able to sit in the Orangerie, in the indoor climate and have generous views over the winter climate with the feeling of actually being on the square instead of inside a building. Outside the Orangerie, public seating will be present in order to allow even *non-customers* to experience the best possible exposure to the sun on the square. Regarding the part of the square with poor exposure to the sun, this was identified as the area to the right of the town hall. Here, they have redesigned the staircase into a sort of stage, to make it possible to attract people to spend time here as well. No other microclimatic parameters have been considered during the design process. The presence of snow and its use on the square have also been studied. The ground of the square will be heated using pipes containing warm water that will be placed under the pavement. A heating system with different zones has been designed, in order to be able to choose which parts of the square should be heated and which should be left cold.

This means that in winter the snow can be left on some parts of the square for esthetic reasons. The snow will give the visual sensation of a soft, white cover in order to enhance the winter. For the winter season of 2017/2018 (the first after finalization of the project), an ice maze was built and ice furniture sculpted in the square. Some events are planned for the winter, like the winter market, and a Christmas tree will be placed in the center of the square each year. A more problematic issue is that the Orangerie is not regarded as a public space. It is supposed to be rent out to an entrepreneur running a cafeteria or small restaurant which will exclude visitors not interested in buying lunch or a cup of coffee.

Public Squares in Residential Areas: Tegsplan, Mariehems Centrum and Nornaplatsen

What about public spaces in residential areas? *Tegsplan* is a square in a commercial area of the neighborhood of *Teg*. The space today consists of a square, surrounded by a church, a grocery store, a bank, a health clinic, a pharmacy, a florist, a hairdresser, a kebab restaurant and an IT company. The square is a completely open space that does not possess many of the characteristics needed in order to be attractive during the winter: seating is scarce, there are no wind barriers, and no other shelter is available besides the extending part of the buildings' roofs. There are however flowerbeds, the edges of which offer seating even in winter time, and some of the people lingering in the space sit down on these, despite the snow. Most stops occur by the ATM and by the entrances of the supermarket and health care center (Lind, 2016).

Mariehems Centrum is a commercial area like *Tegsplan*, located in the neighborhood of *Mariehem*. The space is currently fairly well served by a variety of functions, including a grocery store, an Asian grocery store, two restaurants/pizzerias, two hairdressers, a public youth center and a podiatrist. In the middle is a tiny park with plantings and benches in the summer time, framed by low wall segments (Lind, 2016). This space seems not to be intended for use in the winter – the snow has only been cleared from the area outside the park space, along the routes intended for movement (Lind, 2016, p. 31). Thus, no seating is provided during the winter, and there is no apparent intention to promote lingering in the public space. However, some shelter from wind and precipitation is provided, making it considerably more comfortable than the other two spaces examined in the study, and in the absence of benches, passersby use the wall segments as seating. Variations in weather conditions also demonstrated varied uses of the space: in clear weather, people hung out in the park space; during a drizzle, they instead hid under a roof. During observations, the space is seen to be used as a playground; for riding kickbikes; walking around while on the phone; for eating a quick family meal and meeting up with friends. Out of the studied spaces, this is the one where the most social encounters by far occur, although the social activity increases significantly when the sun is out, highlighting the importance of a pleasant climate for lingering (Lind, 2016).

Nornaplatsen is located in the northernmost section of the neighborhood of *Tomtebo*. The space resembles a local square: it is circular and surrounded by residential buildings, and car traffic is prohibited: although a bus lane runs through it. In the summer time, there are benches, but these are removed during the colder season (Lind, 2016). Bike lanes line its perimeter, merging from all four directions. A small shop, a pizzeria and

a bus stop are the only functions there besides housing. The place does not invite people to linger because of its lack of functions, as well as a design that promotes movement over lingering – especially in the winter, due to a scarcity of seating. Piles of snow left on the square prohibit commercial activities, and with a bus line cutting through the space it is also not an ideal place for children to play. Observations give that 3 out of 4 people lingering in this space do so at the bus stop going toward the central town, a majority of the rest are dog-walkers stopping to let their dogs do their business (Lind, 2016).

The study of the public spaces mentioned above suggest that open, urban spaces are designed to be social spaces: but only in summer time. General and very broad climate-related considerations in designing public space in a Nordic city, such as providing shelter from the wind, maximizing solar access and managing snow in the outdoor environments, are not sufficiently considered in these public spaces. These spaces should not be seen as ‘failed’ public spaces, however. They serve their purpose well, and are appreciated by many users (Lind, 2016). Rather, the studied spaces underline that outdoor public spaces are not designed for ‘unpleasant’ weather. Since summer is relatively short in Umeå, an expected approach would be to consider the cold and dark seasons to a greater extent than the warm and sunny months, in order to maximize the use of public spaces. However, it appears that urban public spaces are not perceived first and foremost as social spaces; at least not year-round. Design elements that encourage encounters and lingering in the space in the warmer season, such as benches, are simply removed during the cold season without the provision of other such elements more suited to the colder climate. Optional meeting spots for the winter season could be integrated into the spaces with relatively small measures, such as shelter from the wind and precipitation, without interfering with summer meeting spots. Instead, the designs of the studied spaces – *Mariehem* possibly being an exception – suggest an assumption that the people of Umeå would rather stay inside during the colder part of the year.

Concluding Discussion

Our study demonstrates that urban public spaces that are designed for winter – i.e. provide sufficient shelter and seating – will be used also in the winter time. When spaces provide pleasant environments, social encounters will take place regardless of the season, as is suggested by the differences in use according to the layout of the studied spaces. If there are reasons to come to a space, in terms of activities and other attractions, people will also linger there if the conditions are favorable. Therefore, maintenance and conditions in a winter climate need to be considered as well, albeit somewhat differently, rather than simply being put on hold until the next summer season. In the case of Umeå, although winter conditions are one of the main issues in urban planning, there is still no common framework for how to approach them. In fact, the knowledge needed for cities with a harsh winter climate is limited to the literature and is effectively implemented in only a few cities. For example, Umeå does not have a specific ‘winter city’ approach in its urban planning, but rather applies basic and random general principles. Meanwhile, other cities have adopted a specific urban plan for winter conditions or documents that give specifics on all urban planning and design. In the city of Umeå, the need for a detailed winter – or non-summer – approach emerged during the interviews with random people in urban public spaces, where appreciation for the spaces was generally expressed along the lines of being really nice and/

or beautiful ‘*in the summer*’, but rather dull at the time of the survey. This is especially harmful for the official city goal of being a livable city, having sustainable transport, and encouraging an environmentally sustainable development. The research project showed that the municipality sometimes forgets about the winter and only highlights the warm season, when green is the predominant color. In reality, the green summer makes up a rather small part of the year: although snow coverage is becoming increasingly scarce, the climate in Umeå is nevertheless characterized by a long, cold and dark autumn and winter season, with snow, sleet and rain. This period should also be reflected in the city planning.

The attitude of omitting the winter perspective can be explained by geographical, political and technical factors. Umeå cannot be defined as a year-round winter city, with a very short warm period and a very long winter, like Lulea, Gällivare or Edmonton. In fact, Umeå is located in the subarctic climate but borders the humid continental climate zone (Peel *et al.* 2007), so it also experiences warm summers for a period of time that varies but is long enough to be fully experienced by its citizens. The political factor derives from the desire for Umeå to be an attractive city to new inhabitants, in order to sustain the current city development. As this goal is highly challenging and important, to achieve it the city tries to show itself especially during the best time of year – summer – during which the city is very pleasant and green. This way of thinking may have affected the municipality employees so much that they try to avoid a winter approach, even though the city needs it. After all, embracing all four seasons in the city plan, and taking advantage of the different conditions they present, will result in a more attractive and livable city. An overly narrow focus on the warmer season risks reducing the rest of the year to simply a long wait for summer. Finally, from a technical perspective, there is a great deficiency of specific studies; standard procedures and manuals do not help architects and planners in designing a winter urban planning approach. It is also probably a question of understanding winter as a concept in the planning process. Is winter something negative that planning should aim to protect the city and its inhabitants from? Snow-clearing, wind protection, falling ice and snow from the buildings, coldness and darkness are all rather negative aspects of winter in an urban area. Planning is here mostly about avoidance and protection (from snow and coldness). Negative winter planning. On the other hand, there are examples of urban areas in Sweden that embrace the winter in a more positive way by developing a white structural plan for the municipality. If winter is connected with positive connotations, winter conditions are more easily considered in a positive way in the planning process. It is here even possible to discuss in terms of two possible discourses or planning stories related to planning in northern cities. The affirmation of snow, low temperatures, ice, etc. as a positive prerequisite for planning or the more negative approach were snow, cold, darkness, etc. is problematic and has to be avoided.

The question is whether the development of specific protocols and documents regarding the winter period could help the municipality make the urban public spaces livable and attractive, with all the beneficial outcomes for the city and its people. We believe that the further incorporation of a year-round perspective in outdoor urban public spaces is a step towards improved livability, inclusiveness and attractiveness in northern cities. This paper wants to acknowledge the lack of such perspective and show that outdoor public spaces are indeed being used also in winter time, if conditions are favorable.

The lack in adopting a specific winter approach in urban planning requires further discussion as to the relationship between knowledge and application, or the lack of application. For further studies it would be interesting to study the local, municipal approach in urban planning to winter climate. We also believe there is a lack of knowledge about how urban citizens relate to winter conditions in an urban environment.

Note

1. A sledding chair. A very popular mode of transport during the winter in northern Sweden.

Disclosure statement

No potential conflict of interest was reported by the authors.

ORCID

Olof Stjernström  <http://orcid.org/0000-0002-6557-3876>

References

- Arendt, H. (1958) *The Human Condition* (Chicago, IL: University of Chicago Press).
- Borja, J., & Muxí, Z. (2001) *Espai Public: Ciutat i Ciutadania* (Barcelona: Diputació de Barcelona).
- Bosselmann, P., Arens, E., Dunker, K., & Wright, R. (1995). Urban form and climate: case study, Toronto. *Journal of the American Planning Association*, 61(2), pp. 226–239.
- Bosselmann, P., Flores, J., Gray, W., Priestley, T., Anderson, R., Arens, E., Dowty, P., So, S., & Kim, J. (1984) *Sun, Wind and Comfort: A Study of Open Spaces and Sidewalks in Four Downtown Areas* (Berkeley: Institute of Urban and Regional Development, College of Environmental Design, University of California).
- Carmona, M., Heath, T., Oc, T., & Tiesdell, S. (2003) *Public Places, Urban Spaces* (Oxford: Architectural Press).
- Carr, S., Francis, M., Rivlin, L. G., & Stone, A. M. (1992) *Public Space* (New York: Cambridge University Press).
- Cooper Marcus, C., & Francis, M. (1998) *People Places: Design Guidelines for Urban Open Space* (New York: Wiley).
- Culjat, B., & Erskine, R. (1988) Climate-responsive social space: A Scandinavian perspective, in: J. Manty & N. Pressman (Eds) *Cities Designed for Winter*, pp. 347–363 (Helsinki: Building Book Ltd.).
- Dempsey, N., Bramley, G., Power, S., & Brown, C. (2011) The social dimension of sustainable development: Defining urban social sustainability, *Sustainable Development*, 19, pp. 289–300. doi:10.1002/sd.v19.5
- Ebrahimabadi, S. (2015) Outdoor comfort in cold climates, integrating microclimate factors in urban design, Doctoral thesis, Luleå University of Technology, Department of Civil, Environmental and Natural Resources Engineering, Division of Architecture and Water.
- Eliasson, I. (2000) The use of climate knowledge in urban planning, *Landscape and Urban Planning*, 48(1–2), pp. 31–44. doi:10.1016/S0169-2046(00)00034-7
- Eliasson, I., Knez, I., Westerberg, U., Thorsson, S., & Lindberg, F. (2007) Climate and behaviour in a Nordic city, *Landscape and Urban Planning*, 82(1–2), pp. 72–84. doi:10.1016/j.landurbplan.2007.01.020

- Gällivare Municipality. (2016) *Grön-, blå-, och vitstrukturplan Gällivare* (Gällivare Municipality). Available at http://www.gallivare.se/PageFiles/19806/GBV_slutlig_20160321.pdf (accessed 2 October 2016).
- Garcia-Ramon, M. D., Ortiz, A., & Prats, M. (2004) Urban planning, gender and the use of public space in a peripheral neighbourhood of Barcelona, *Cities (London, England)*, 21(3), pp. 215–223. doi:10.1016/j.cities.2004.03.006
- Gehl, J. (1987) *Life Between Buildings* (New York: Van Nostrand-Reinhold).
- Gehl, J. (2013). *Cities for people*. Island press.
- Hall, P. (2002). *Global city-regions in the twenty-first century*. Oxford University Press.
- Harvey, D. (1992). Social justice, postmodernism and the city. *International Journal of Urban and Regional Research*, 16(4), pp. 588–601.
- Hass-Klau, C., Crampton, G., Dowland, C., & Nold, I. (1999) *Streets as Living Space: Helping Public Spaces Play Their Proper Role* (London: ETP/Landor).
- Jacobs, J. (1961). The death and life of American cities.
- LeGates, R. T., & Stout, F. (Eds.). (2015). *The city reader*. Routledge.
- Lind, R. (2016). Public space-a meeting place?: Understanding the spatial prerequisites for spontaneous interaction, and the importance of such for a socially integrated society.
- Lopez de Lucio, R. (2000) El espacio publico en la ciudad europea: Entre la crisis y las iniciativas de recuperacion. Implicaciones para Latinoamerica, *Revista de Occidente* 230/231, julio-agosto, pp. 105–121.
- Lynch, K. (1961) *The Image of the City* (Cambridge: Harvard University Press).
- Madanipour, A. (1996) *Design of Urban Space* (New York: Wiley).
- Marcus, C. C. (1975). *Easter Hill Village: Some social implications of design*. New York, NY: Free Press.
- Marcuse, P. (2014) The paradoxes of public space, *Journal of Architecture and Urbanism*, 38(1), pp. 102–106. doi:10.3846/20297955.2014.891559
- Mehta, V. (2007) Lively streets: Determining environmental characteristics to support social behavior, *Journal of Planning Education and Research*, 27(2), pp. 165–187. doi:10.1177/0739456X07307947
- Mehta, V. (2014) Evaluating public space, *Journal of Urban Design*, 19(1), pp. 53–88. doi:10.1080/13574809.2013.854698
- Mitchell, D. (1995) The end of public space? People's park, definitions of the public, and democracy, *Annals of the Association of American Geographers*, 85, pp. 108–133.
- Mitchell, D. (2003) *The Right to the City: Social Justice and the Fight for Public Space* (New York: Guilford Press).
- Montgomery, J. (1998) Making a city: Urbanity, vitality and urban design, *Journal of Urban Design*, 3(1), pp. 93–116. doi:10.1080/13574809808724418
- Nikolopoulou, M., Baker, N., & Steemers, K. (2001) Thermal comfort in outdoor urban spaces: Understanding the human parameter, *Solar Energy*, 70(3), pp. 227–235. doi:10.1016/S0038-092X(00)00093-1
- Nilsson, K. L., & Kostenius, C. (2016) *Hälsa på hal is* [Health on thin ice] Plan Föreningen för samhällsplanering, Stockholm 3/2016, pp. 18–23.
- Oc, T., & Tiesdell, S. (1999) The fortress, the panoptic, the regulatory and the animated: Planning and urban design approaches to safer city centers, *Landscape Research*, 24(3), pp. 265–286. doi:10.1080/01426399908706563
- Peel, M. C., Finlayson, B. L., & McMahon, T. A. (2007). Updated world map of the Köppen-Geiger climate classification. *Hydrology and earth system sciences discussions*, 4(2), pp. 439–473.
- Pressman, N. (2004) *Shaping Cities for Winter: Climatic Comfort and Sustainable Design* (Prince George, BC: Winter Cities Association).
- Pressman, N., & Lüttgen, A. (2002) Climatic comfort in Northern public space. Available at ftp://ip20017719.eng.ufjf.br/Public/AnaisEventosCientificos/PLEA_2002/7_CASE_STUDIES/PRESSMAN.PDF
- Pressman, N. E. P. (1996) Sustainable winter cities: Future directions for planning, policy and design, *Atmospheric Environment*, 30(3), pp. 521–529. doi:10.1016/1352-2310(95)00012-7

- Project for Public Spaces. (2008) What makes a successful place? Available at http://www.pps.org/topics/gps/gr_place_feat
- SMHI (2014a) Snö: Normalvärden. Available at <http://www.smhi.se/klimatdata/meteorologi/sno>
- SMHI (2014b) Solstrålning i Sverige sedan 1983. Available at <http://www.smhi.se/klimatdata/meteorologi/stralning/solstralning-i-sverige-sedan-1983-1.8243>
- SMHI (2017) Swedish meteorology and hydrological institute. Available at <https://www.smhi.se/en/climate>
- Thomas, M. (1991) The demise of public space, in: V. Nadin & J. Doak (Eds) *Town Planning Responses to City Change*, pp. 209–224 (Aldershot: Avebury).
- Thorsson, S., Lindqvist, M., & Lindqvist, S. (2004) Thermal bioclimatic conditions and patterns of behaviour in an urban park in Sweden, *Journal of Biometeorology*, 48, pp. 149–156. doi:10.1007/s00484-003-0189-8
- Umeå Municipality. (2017a) Skidspår. Available at <http://www.umea.se/umeakommun/kulturochfritid/idrottmotionochfriluftsliv/friluftslivochmotion/skidakning.4.47ef0ac5128fb2981a28000790.html> (accessed 16 February 2017).
- Umeå Municipality. (2017b) Skridskoåkning. Available at <http://www.umea.se/umeakommun/kultur ochfritid/idrottmotionochfriluftsliv/friluftslivochmotion/skridskoakning.4.47ef0ac5128fb2981a28000807.html> (accessed 16 February 2017).
- Westerberg, U. (1994) Climatic planning—Physics or symbolism, *Architecture and Behaviour*, 19, pp. 49–72.
- Westin, G. (1990) *Akademien i storskogen* (Umeå: Umeå universitet).
- Whyte, W. H. (1980) *The Social Life of Small Urban Spaces* (Washington, DC: The Conservation Foundation).
- Winter City Edmonton. (2016) *Winter Design Guidelines* (Edmonton City Government). Available at https://www.edmonton.ca/city_government/documents/PDF/WinterCityDesignGuidelines_draft.pdf (accessed 2 October 2016).
- Young, I. (2000) *Inclusion and Democracy* (Oxford: Oxford University Press).
- Zacharias, J., Stathopoulos, T., & Wu, H. (2001) Microclimate and downtown open space activity, *Environment and Behavior*, 33, pp. 296–315. doi:10.1177/0013916501332008