Urban open space management in the Nordic countries. Identification of current challenges based on managers' perceptions

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ABSTRACT

This paper reports on how Nordic practise relates to, and perceives contemporary challenges to urban open space management. The study used a case study approach, via interviews. The studied Nordic cities experience the effects of densification in inner city areas. This is often resulting in higher pressure on existing urban open spaces, but also generating new spaces which tend to be small and fragmented, not meeting the many wishes and demands asked for by the diverse user groups. While budgets are sufficiently allocated in new development projects, it is a challenge to withstand the maintenance budgets, forcing managers to prioritise. Due to primary political interest in inner city areas, there is a risk of managers not prioritising the more peripheral areas, from where resources are often transferred to the newly developed areas. This creates a new type of urban nature, primarily in the urban peripheral areas, with increased amounts of biodiversity and higher amounts of multi-functionality, compared to the smaller and more intensively programmed inner-city areas. Urban open space managers are relying on the existing municipal planning tools, and to varying degrees act strategically in terms of developing own sector oriented plans and strategies.

1. Introduction

As a global trend, migration from rural to urban areas is intensifying (UN, 2014). This imposes pressure on existing urban agglomerations, including both inner city areas and urban fringes where new developments tend to sprawl (e.g. Brody, 2013). Urban green spaces, a term encompassing heterogeneous urban landscapes of high temporal and spatial diversity (Haase et al., 2014), are a central element within the urban matrix (Pickett et al., 2004). Urban green spaces include parks, woodlands, cemeteries, allotment gardens, playing fields, home gardens and other green units in residential areas (Cvejić et al., 2015). Other central elements of the urban matrix are grey spaces (e.g. squares, roads and pedestrian streets), brown spaces (e.g. abandoned land areas such as industrial sites, previous transport infrastructure or housing) and blue spaces (e.g. lakes, canals and waterfronts) (Haase et al., 2020). This conglomeration of green, grey, brown and blue spaces has been denoted 'urban open spaces' (UOS) (Jansson & Randrup, 2020), and includes the different types of urban spaces managed by 'green space management' (e.g. Fongar et al., 2019) or 'park management' (e.g. Chan et al., 2020). In this paper, we apply the UOS definition, based on the complexity of spaces it includes, and refer to those managing such spaces as UOS managers.

UOS have multiple values, through provision of ecosystem services (MEA, 2005). The quantity of ecosystem services provided depends on the physical qualities and functions of UOS, which provide benefits for both urban residents and the environment (Haines-Young & Potschin, 2008). Green spaces may constitute more than 50% of total urban land cover (Haase et al., 2020) and provide a number of regulating ecosystem services, such as cooling air temperature and improving air quality, but also a number of cultural services, such as opportunities for recreation, spiritual engagement, social interaction and physical activity. In addition, green spaces are the main provider of habitats for urban flora and fauna, thus sustaining urban biodiversity. Blue spaces provide regulating services in terms of cooling air temperature, but in urban areas may be most valued for their supporting services in supplying water, or for cultural services such as opportunities for recreation and physical activities. Both green and blue spaces are critical in alleviating climate change in terms of adaptation and mitigation, e.g. via storm water management measures. Brown spaces provide regulating services via spontaneous vegetation and thus also cultural services in line with those of green spaces, although often to a lesser degree. Grey spaces primarily provide cultural services such as opportunities for recreation (Barton et al., 2020; Luederitz et al., 2015). The quantities of services provided are affected by UOS management, which requires a long-term perspective on various scales and within various contexts, involving experience based on both practice and theory (Jansson et al., 2020).

Development strategies that fail to provide for properly planned UOS may be detrimental to neighbourhood quality of life (Douglas et al., 2018). However, UOS managers must also address many of the current environmental and ecological challenges prevailing in society (Soga &

Gaston, 2016). These include urbanisation and densification and also climate change adaptation and mitigation, e.g. by urban storm water management (Qiao et al., 2018) and resulting attempts to create multi-functional spaces. Individualisation, understood as increased demand by citizens for engagement and involvement (Buijs et al., 2016), and de-mographic changes in terms of e.g. migration resulting in increased pressure on public funding (EU, 2017) are current challenges commonly experienced within UOS management. There is a general understanding, and expectation, that such challenges can be dealt with by active governance and management of UOS (Randrup & Jansson, 2020). However, recent studies have indicated that UOS managers are now operating with less influence and tighter budgets than previously (e.g. Fongar et al., 2019; Lindholst et al., 2017; Neal, 2016).

Recently, the Nordic Council of Ministers appointed a working group for Nordic Sustainable Cities 2019–2022 (Hållbara städer). Boverket (The Swedish National Board of Housing, Building and Planning) co-ordinates the working group, with a vision to create a model for the world's most attractive cities by the use of UOS. As specific means, for achieving this the working group was tasked with developing a suite of best-practices within urban green space planning and management, and with influencing Nordic and ultimately the EU policy and strategy making in relation to future urban green space planning and develop-ment. Boverket has commissioned the authors to study and document UGS management practices across the five Nordic countries. The objective of this paper is to study how Nordic practice relates to, and perceives contemporary challenges to UGS.

1.1. Urban open space management – and maintenance

The basis for active UOS management is that landscapes are usually developed in a hierarchical, chronological way, beginning with a plan set by authorities on national, regional and local level. Such plans in-fluence the provision of UOS, e.g. defining standards, rules and regula-tions. From these, more detailed designs on various scales are produced and then realised through construction, planting, etc. Maintenance practices tend to 'end' this sequence of the landscaping work process (Jansson et al., 2020). However, UOS management involves more than maintenance, and with a strategic approach it can also include aspects of planning, design and construction, as shown in Fig. 1.

The Nordic approach to UOS management uses two sets of behav-ioural approaches, sectoral and cross-sectoral (Randrup & Persson, 2009). This reflects the fact that the UOS organisation has its own task to fulfil (primarily management-oriented within the sector), but also tasks and obligations relating to the larger organisation, such as health, ed-ucation and culture (cross-sectoral and more leadership-oriented). These tasks are performed at different levels. At the *policy level*, long-term and visionary goals and ambitions set the direction. All five Nordic countries have legislation to support provision of green spaces (Lidmo et al., 2019). However, despite the existence of these national policies, pri-mary regulations and decisions related to UOS are usually made at the local government level in all the Nordic countries (Lidmo et al., 2019; Randrup & Persson, 2009) like in e.g. the UK (Dempsey & Smith, 2014). Policies may be developed at the tactical level, but are generally based on an overarching strategy, or approved by decision makers at the policy level. A UOS management policy is a statement within the organisation, and its purpose is to set a direction from the policy level. It covers the entire organisation or a defined theme within it (green spaces, play-grounds, trees etc.) and relates directly to the UOS management orga-nisation in question. Most often, such policies are cross-sectoral, relating to other parts of the organisation such as culture, healthcare, elderly care and education, and involve positioning, visualising and emphasis-ing the relations between UOS management and other important parts of an organisation. At the *tactical level*, plans or guidelines are created, ideally based on an overarching strategy from the policy level. Within the UOS organisation, these may include a tree inventory, an overview of playgrounds or a plan for maintaining cultural heritage. Budgeting is
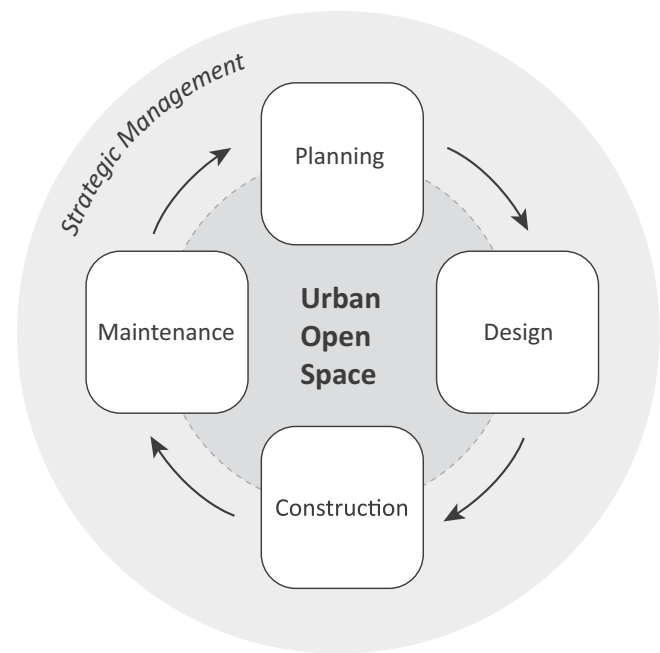

Fig. 1. The strategic management model, involving a long-term perspective on green space management, in which planning, design, construction and main-tenance occur in a cyclic routine. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.) From Jansson et al. (2020).

related to the tactical level, as are contract steering and organisation of staff. Public engagement of various types is also regarded as a task relating mainly to the tactical level. There is an obvious overlap between the tactical and the *operational level*, relating to the practical work of upkeep and maintenance, steering contracts and organising actual maintenance operations. Ideally, a strategically minded UOS manage-ment organisation covers all three levels. However, operational main-tenance, often short-term and routine-based activities, takes up the majority of resources for many UOS organisations (Fongar et al., 2019; Randrup et al., 2017; Randrup & Persson, 2009). This may relate to where in the organisation the UOS managers are located, and thus how distant UOS management is from the political level. Fig. 2 illustrates the three managerial levels and their interrelationships.

1.2. Policy arrangements describing governance approaches

In the policy arrangement model (PAM) developed by Arnouts et al. (2012), policy arrangements and even governance arrangements (Jansson et al., 2019) can be determined by the resources available, the network of actors, and their roles and relations. Such arrangements take place in public domains (policy domains), where formal regulations, public interests and societal values are all considered. Decision-making and implementation are operationalised through coordination and collaboration, but with certain rules, legitimacy and power distribution, as set through policy instruments. Thus, the PAM can be defined by describing discourses, actors, resources and rules of the game.

1.3. Objectives

The objective of the present study was to compile an overview of how Nordic practitioners relate to, and perceive, contemporary challenges in UOS management. Two overall research questions (RQ) were formulated:

RQ 1. How is urban open space development and the prerequisites for UOS management perceived by Nordic UOS managers?
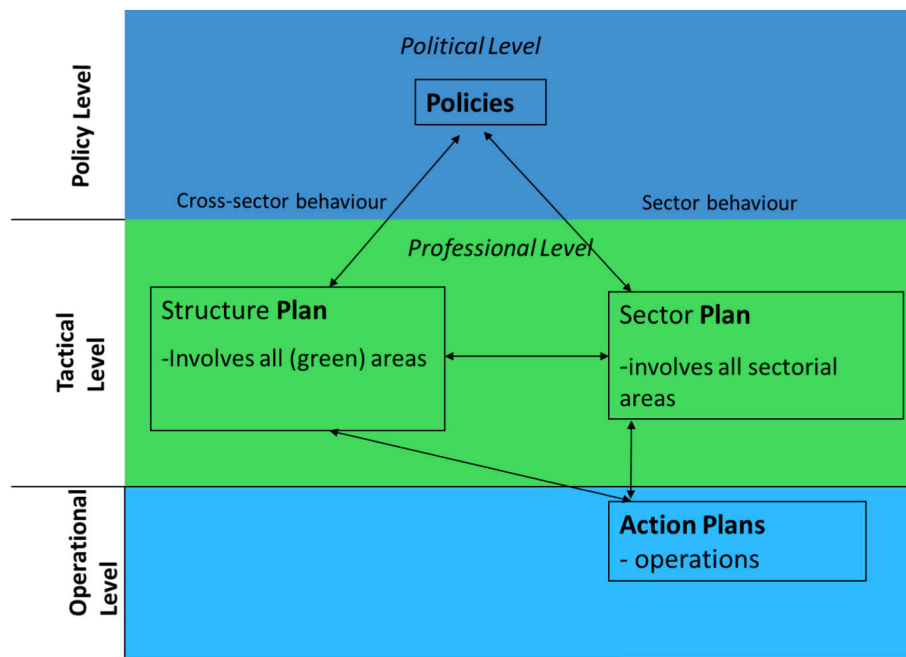
Fig. 2. The three levels of urban open space management.
Adapted from Randrup and Persson (2009).

RQ 2. What are the most prominent challenges for future development of urban open spaces?

2. Method

2.1. Perception studies

Perception studies are usually performed as physiological studies with emphasis on understanding human perceptions of life or cognitive processes (e.g. Freeman, 1991). This may include all aspects of human life, and thus perception contributes to the control of actions (Prinz, 1990). In UOS management, the degree of action relates to the managers' relationship to their environment, in this case the organisation within which they manage and the physical environment they manage. Collecting a multitude of individual perceptions may help to generate an overview of a certain aspect or phenomenon, as long as the perceptions sought are somewhat comparable (Allen, 2018).

2.2. Case selection process

The study was conducted using a qualitative case study approach. In each of the five Nordic countries, three UOS managers were asked to present their local perspectives. The number of cases was set in order to obtain representation from each country, but primarily to have a sufficient amount of inputs from the Nordic region as a whole. Thus, the ambition was to gain a Nordic overview, rather than to perform a comparative study on the Nordic countries. The sampling approach involved selecting managers representing the three largest urban areas in each country, excluding the capital city. This provided a case representation of managers representing larger national cities, but still representing different sizes, geographical distributions and organisational positioning. The capital cities were not included because of the complexity in identifying one individual with a full overview of the entire city. Local governments often organise their UOS management into units specialising in planning, design, construction and management (Randrup & Jansson, 2020). In larger urban organisations, such as those covering the Nordic capitals, Copenhagen (Denmark), Stockholm (Sweden), Oslo (Norway) and Helsinki (Finland), the UOS management

set-up is complex compared to other cities in the country. The selected managers represented cities which were clearly large compared to the average or median size city, and in total represented 12% to 19% of the national inhabitants, (13% of all Nordic inhabitants), (see Table 1).

The participating managers were identified using the researchers' existing networks or via snowballing through professional networks or national park management organisations. In some cases, the managers were identified via the city's technical director.

2.3. The selected interviewees

Fifteen cities were included in the survey, as listed in Table 1 and indicated in Figs. 3 and 4. Results from only 14 interviews are presented, as it was not possible to identify an UOS manager in the Icelandic city of Akureyri. The interviewees were the senior UOS representative in each city (e.g. Head of Green Spaces, Park Superintendent, Head of Green Space Maintenance etc.), and were assumed to provide a representative view of each city's challenges and approaches to these. The sum of these individual viewpoints provided a general overview of how Nordic practice relates to, and perceives, contemporary challenges to UOS management.

Table 2 lists the city, country, organisational level within the organisation, title and department, section or unit of each of the interviewees. Six of the 14 interviewees were on level 4, meaning that they had three organisation executives between them and the political decision-making level. Another six of the interviewees were on level 3, with only two located on level 2. Many of the managers were positioned within a technical department, as a sub-unit focusing on UOS. Five held the post of City Gardener, eight were Head of Department/Section/Unit and one had the formal role of Production Manager.

2.4. Interview process

All managers were interviewed using a semi-structured approach in which five themes were pre-defined, and in some cases structured in sub-headings. The interview guide (see Appendix) was based on recent surveys directed at local government green space managers in Sweden (Randrup et al., 2017) and Norway (Fongar et al., 2019), which were

Table 1

Inhabitants in each of the five Nordic countries, divided into national average size, national median size, and average size of the cities selected for the study. N represents the national number of local governments.

Inhabitants	S[1] (*N* = 290)	DK[2] (*N* = 98)	N[3] (N-372)	F[4] (*N* = 310)	IS[5] (*N* = 72)	Nordic (*N* = 1126)
Average	35,612	59,245	14,267	16,088	5058	22,996
Median	16,024	43,000	4146	5128	876	7251
Average (survey)	384,738 (N = 3)	254,942 (N = 3)	210,889 (N = 3)	244,641 (N = 3)	33,965 (N = 2)	239,540
% of total population (survey)	12%	13%	12%	15%	19%	13%

1) Statistics Sweden 2019 (SCB.se).
2) Statistics Denmark 2020 (statistikbanken.dk).
3) Norway Administrative Division 2020 (https://www.citypopulation.de/en/norway/admin/).
4) List of Finnish Municipalities 2020 (https://en.wikipedia.org/wiki/List_of_Finnish_municipalities).
5) Iceland: Division, Regions and Municipalities 2020 (https://www.citypopulation.de/en/iceland/admin/).
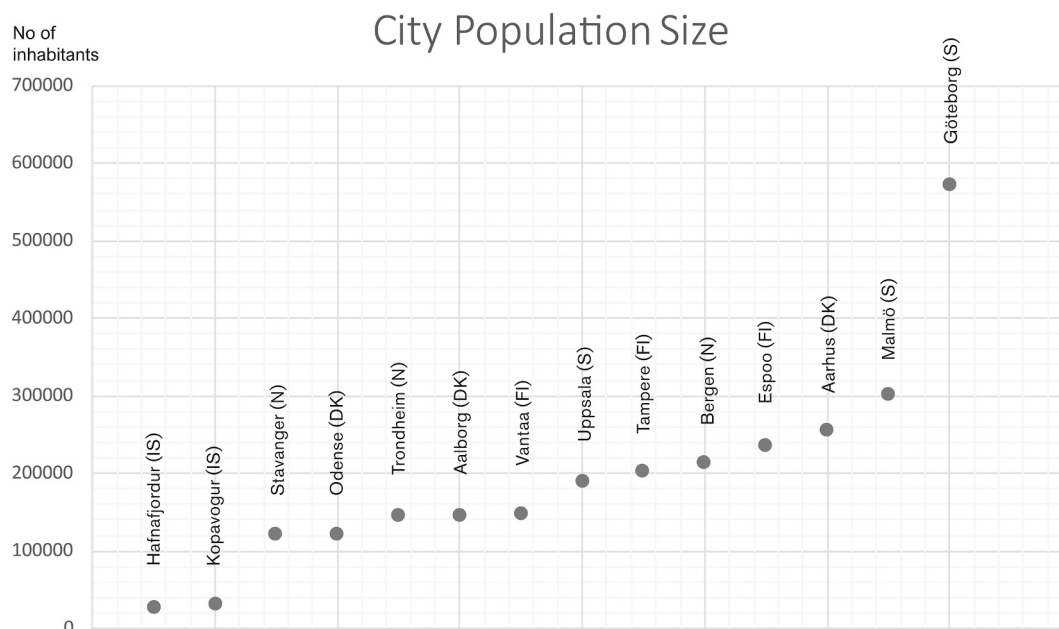

Fig. 3. Approximate population size distribution of the cities represented by the 14 interviewees.
Source: Geonames.

based upon similar surveys made in the UK (Neal, 2014, 2016). For all answers, personal reflections were sought. The following themes and questions were covered:

1) Roles and organisation, focusing on formal role and position within the local government organisation.
2) Discourses, focusing on the prevailing discourses regarding UOS management.
3) Quality status and needs, focusing on how the term 'quality' is perceived and whether the desired qualities are achieved today. The current budget situation was also reflected upon.
4) Changes in relation to quality and needs, focusing on how quality, amounts of green spaces, sizes of green spaces and budgets have changed during the past 3–5 years, and how the situation will develop during the coming 3–5 years.
5) Plans and strategies, focusing on the current use of strategies and plans for management of urban greens spaces.
6) Requirements on future policy and/or planning documents and good local examples to be shared with the Nordic community.

All interviews were conducted via telephone or Skype, within an average duration of 1 h per interview. All interviews were recorded and transcribed for key answers and responses. Each transcript was 3–5 pages long. Each interview was based on the managers' current job situation, and thus it assessed how the manager perceived the local

context. By comparing results, an overview on the Nordic level was obtained.

2.5. Analysis

A qualitative analysis of the various perceptions of UOS size, budget, etc. was performed, with no differentiation between cities (e.g. in relation to size or the manager's location within the organisation). In March 2020, the initial results were discussed with the working group for Nordic Sustainable Cities 2019–2022, and with some of the managers interviewed. This provided valuable inputs to the discussion and perspectives on the results.

The PAM approach (Arnouts et al., 2012) was then used as an analytical framework for assessing the managers' perceived discourses, user relations, budgets and plans.

3. Results and discussion

In the following, the results of the survey are presented and grouped into six overall themes, which are discussed individually. A summary of the findings is the presented, based on the PAM approach, which identified four key trends.
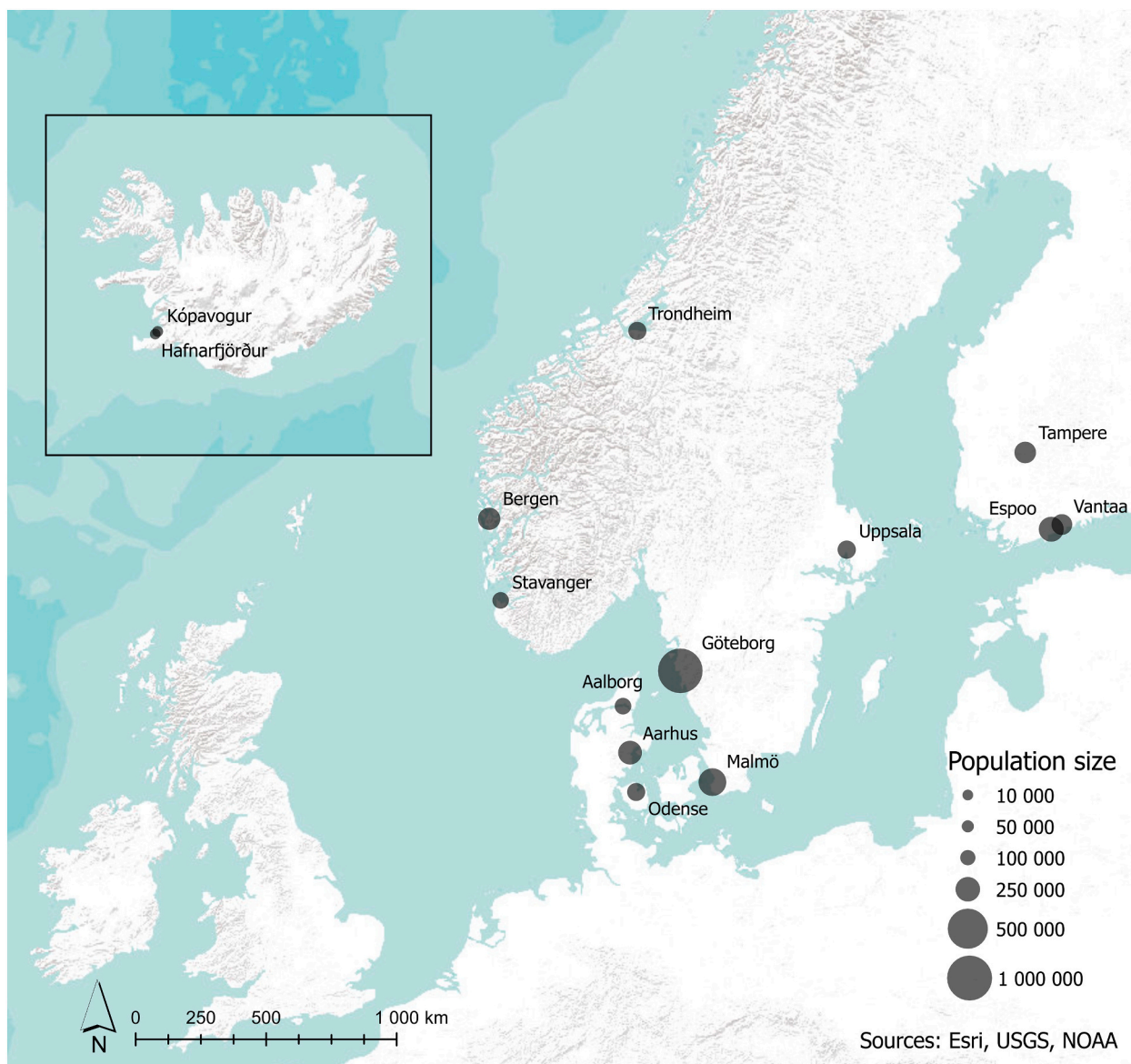
Fig. 4. Geographical distribution of the cities represented by the 14 interviewees, shown in relation to population (range 26,808 to 572,799).ubli Data: Population size © Geonames.

3.1. Perception of role and organisation

The UOS managers reported experiencing a gradual demotion away from the political decision-making level. However, the managers generally seemed satisfied with their placement within the organisation and especially within a technical department, as technical issues are currently experiencing much political interest, with climate change and biodiversity loss as two central contemporary themes.

In contrast to an earlier Nordic study (Randrup & Persson, 2009), the results indicated a potential shift within UOS management, with the managers' positions being pushed down a level. This was perceived by some managers as a reduction in their influence in relation to the overall policy level. There are several possible reasons for this trend, none of which was explicitly stated in interviews. In a study of decentralised management of public squares in the city of Sao Paulo, Brazil, Benchimol et al. (2017) were unable to identify any specific model of management for the squares. They concluded that decentralised management can be positive, in that it provides autonomy and agility for subprefectures to implement their policies, but also that it creates difficulties because management depends on the planning and control of resources by different local government levels to which it is not directly connected (the silo effect of local governments). In the present study, one manager attributed the general downward shift in position to the loss of a City Gardener post. The title was viewed by some managers as an important way to gain influence, both internally with politicians and externally, by creating a clear picture of who is responsible for UOS, with loss of the title resulting in reduced influence among managers. Thus, the title could have a potential role in 'ensuring' positions. However, for the cities that had a City Gardener, the position within the organisations varied widely (from level 2–4).

> "This organisation is worse than before because previously we had a City Gardener who was Head of Division. (…) I don't have the possibility to impact on the larger picture. As Head of Unit, I have no mandate or power in my title."

It is possible that the title itself is more important than the actual "role". One manager described the role as being an interpreter between professional knowledge and politicians, indicating a need to have close relations with the specific expertise and with politicians:

Table 2
City, country, organisational level within the organisation, title and department, section or unit of the 14 interviewees.

City (Country)	Organisational level	Title/Role	Department/ Section/Unit
Stavanger (Norway)	3	Head of Department	Dept. of Parks and Roads
Bergen (Norway)	4	Head of Section	Section of Parks
Trondheim (Norway)	4	Head of Department	Dept. of Urban Space and Green Infrastructure
Odense (Denmark)	3	Head of Department	Dept. of Roads and Parks
Aarhus (Denmark)	2	Head of Department	Maintenance Dept.
Aalborg (Denmark)	2	City Gardener/ Head of Dept.	Dept. of Park and Nature
Gothenburg (Sweden)	3	City Gardener	–
Uppsala (Sweden)	3	City Gardener	–
Malmö (Sweden)	3	Head of Unit	Unit of City Environment
Vantaa (Finland)	4	Head of Unit	Maintenance
Espoo (Finland)	4	Production Manager	Maintenance
Tampera (Finland)	4	City Gardener / Manager of Parks and Gardens	Unit of Green Space and Storm Water
Kopavogur (Iceland)	3	Head of Department	Dept. of Streets
Hafnafjordor (Iceland)	4	City Gardener / Head of Section	Section of Green Spaces

"I am an interpreter between politicians and professional knowledge."

The managers were divided between those having management as a strategic theme and those primarily having a focus on operational level, mainly maintenance. In a review of green space management approaches, Jansson and Lindgren (2012) distinguished between organisational and strategic aspects of managerial activities and concluded that UOS are ultimately managed to provide user benefits, irrespective of whether the focus is on management as a strategic theme or an operational task. Most of the managers interviewed in the present study worked within a technical department, some with budget responsibility and others with a superior strategic role, e.g. as City Gardener, with no budget or personnel responsibility. The technical department was generally perceived as a good place to work within the organisation, as it has responsibility for many large and influential aspects within the local government organisation. In addition, there was perceived political interest in the technical department:

"The technical area is very visible for both politicians and citizens. This makes the area very relevant for making politics. It is a highly prioritised area and very prominent to be part of, seen from a political perspective."

However, for UOS management to be successful, cooperation between different departments is crucial and was seen as a factor for success by many of the managers interviewed. As UOS are dealt with throughout a process (from planning to maintenance), many different actors and departments need to take UOS into account:

"… because there is a good cooperation between the maintenance and design people. We can have opinions on the design, so I think we have a good collaboration and quality."

Organisational silos are usually perceived as hindering cooperation (see e.g. Forsten-Astikainen et al., 2017; Randrup & Jansson, 2020; Tett,

2016), but having independent departments within larger organisations might also provide benefits. Silos fill an important role by functioning as a hub of knowledge, from which the people working within the management field can seek knowledge and support and which can act as discussion forums.

"We need the silos, but we also need to shoot holes in them so other perspectives can shine in."

3.2. Perception of prevailing discourses

Densification as an overall trend was reported by the Nordic UOS managers interviewed. This may lead to cuts in existing green spaces, but was primarily seen as transformation of former industrial or harbour areas (brown spaces), leading to new, but generally small, green spaces.

The many discourses mentioned by the 14 managers are shown in Fig. 5 as a word-cloud, based on how many times the discourse was mentioned, with densification as the dominant theme. Ecological perspectives on sustainability constituted another main group (storm water management, climate adaptation, environmental matters, biodiversity, and multi-functionality), while the need for a holistic approach to UOS management (strategic green plans and connectivity) and even threats to UOS (user pressure) constituted a third group. Fig. 5 also shows numerous other discourses, all mentioned once or twice.

Densification, an important trend or process in most cities, affects UOS in several ways (Haaland & Konijnedijk van den Bosch, 2015). Colding et al. (2020) described incremental changes in urban green space, where political land-use decisions can cumulatively result in undesirable societal outcomes, leading to a gradual loss of opportunities for (urban) nature experiences. Haaland and Konijnendijk van den Bosch (2015) found that urban densification processes, including infill development, can pose a threat to UOS. However, our survey showed that when discussing the impacts of densification, it is essential to distinguish between re-development of the existing city and new developments on non-programmed or undeveloped land, as these two processes affect UOS differently. The process of re-development transforms brown spaces (brownfield sites, harbour areas and other often
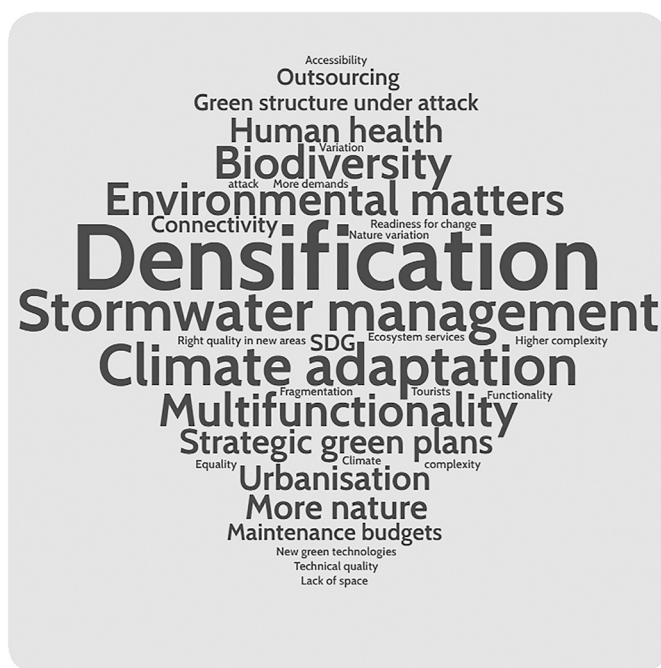

Fig. 5. Cloud diagram showing the terms used by Nordic urban open space managers to explain the dominant discourses currently perceived. The larger the font, the more times the specific discourse was mentioned.

inner-city areas) into housing or commercial sites, a change that may result in new UOS. New developments were also often perceived by the interviewees as taking place on (green) spaces which are not fully programmed or without a clear purpose for users:

> "Transformation of industrial areas is positive for the development of new green spaces."

> "Green spaces have been reduced in both amount and size. They have exploited parts of our largest park, but there are also other green spaces being created. And when a park is exploited, it is only the parts that are not being used, so they don't really remove any value in that sense."

The many discourses focusing on a holistic view of UOS (e.g. connectivity, strategic green, biodiversity) indicated a transition away from a local perspective on individual parks to the need for a more strategic, and biodiversity-driven, approach in management. This is clearly in line with international developments, as the concept of green infrastructure as a means for spatially connected green spaces has emerged during recent decades (see e.g. Hansen & Pauleit, 2014; Seiwert & Rößler, 2020), including for the benefit of biodiversity (Connop et al., 2016; Salomaa et al., 2017).

> "A change is seen from purely recreating functions to more nature, biological, biodiversity agenda. The health aspect is also increasing."

> "Nature is on the increase, which is a matter of changing from traditional maintenance to a more nature-like approach – which is a combination of budgetary re-prioritising and an overall increased biodiversity interest. A new impression is arising."

3.3. Perception of quality

The dominant "qualities" that constitute qualitative UOS, based on number of times they were mentioned, are usability and variation. Both have a clear user-oriented perspective. A second group of quality perceptions included relevance, accessibility, multi-functionality, technical

Fig. 6. Cloud diagram showing the terms used by Nordic urban open space managers to explain quality in relation to urban green spaces. The larger the font, the more times the term was mentioned.

quality and connectivity (see Fig. 6).

Nine of the 14 managers interviewed reported that they are delivering high-quality UOS today, while the remaining five reported that in some areas they meet the quality expectations, while in others they do not.

Six of 14 managers reported an increase in quality during the past 3–5 years, while seven reported no change in quality and one manager perceived a decrease in the quality of UOS. There was generally more divergence regarding future upkeep of quality, with two managers foreseeing a decrease in quality and two unable to make projection on this issue. However, almost half of the managers were optimistic for the future and foresaw an increase in quality in the coming 3–5 years.

Several of the qualities mentioned refer to the user or the use of the spaces (e.g. attractiveness and user satisfaction). However, aspects of quality which to some degree can be perceived as technical (e.g. technical quality, accessibility in terms of distance, and size) were also raised by the managers and perceived as a critical aspect of quality of UOS. Provision of green spaces is well-known to be critical for human health and well-being (Scott et al., 2019; Stigsdotter et al., 2010; WHO, 2016). However, densification can shift the focus from publicly accessible UOS to residential land, which might result in an unequal distribution of UOS in cities (Kabisch & Haase, 2014). Rutt and Gulsrud (2016, p. 124) claim that "management of UOS could be strengthened by more examinations of differentiated distribution of various UOS and the implications over time, alongside explorations into pluralistic notion of quality". Actual perceptions of UOS were studied by Douglas et al. (2019), who identified that positive perceptions of UOS are important as predictors of neighbourhood quality of life. Thus, provision of attractive and relevant spaces, combined with user satisfaction, are important factors in relation to management of UOS. Increased individualisation, and a related increase in demand for engagement and involvement by citizens, are well described in the literature (e.g. Buijs et al., 2016; Jansson et al., 2020), and were confirmed by the managers interviewed here:

> "The use by the users is quality."

> "The users are more concerned about quality than ever before."

Focusing on usability, variation, multi-functionality etc. as a quality indicator is one method to capture different needs between users specifically and citizens in general (Fors, 2018). Some managers reported that users are also good at giving feedback about quality and that this often supports management. One interviewee argued that UOS managers have become better at understanding the use and reasons behind quality, making them better at improving the quality:

> *"Content-wise I think (*the quality*) has improved because we have become better at understanding (*the users*). We see parks that are not being used, and this could be explained by many different things such as safety or access (roads separating the green areas from the people) or no content. And we are working continually on that."*

However, use and users were often regarded as a single issue, whereas both the literature and practice differentiate between needs and preferences of different user groups (e.g. Colding et al., 2006; WHO, 2017).

In general, the interviewees expressed concern about loss of quality due to increased densification, leading to more focus on some areas than others. They also expressed a fear that densification may lead to lower quality in the future, by increasing user pressure on existing green spaces. Densification was mentioned as a force for re-prioritisation of resources and qualities of UOS within the cities represented by the interviewees. They reported that this is done by having different kinds of quality focus for different areas in the cities, as a way to cope with changing user pressure and pressed maintenance budgets:

> "I think the quality might be reduced due to densification."

"I think we are trying to keep the quality high in built, urban areas, but we are going to lower the quality standards in the single-house areas outside the more dense urban setting."

Many managers mentioned a transformation to more naturalistic and wild expressions on the outskirts of their cities as a result of re-prioritising resources, higher user demands and densification in central urban areas:

"One thing being looked at is to make the city more 'wild' or more sustainable – even though this is economically driven, it is something we want to work with, in any case."

However, this change in 'quality' differed between urban areas, with the more central areas of cities, with high user pressure, going the opposite direction. The managers reported a shift in the material used in more central UOS, with a tendency for more hard surfaces and reduced vegetation as a way to cope with the increasing user pressure, and subsequent wear and tear:

"Quality has changed in terms of use of materials – a result of increased use, and the climate focus."

This transformation and re-prioritisation of resources leading to new types of quality in terms of materials and vegetation appears complex. Interestingly, terms like biodiversity, ecology and aesthetics were not mentioned when defining 'quality'. One reason might be that these values are used within the planning departments as part of overall policy making (Bekessy et al., 2012; Hagemann et al., 2020), and that UOS managers are more focused on hand-on issues related to tactical and operational matters, e.g. use, user preferences and technical quality.

3.4. Perception of size and amount of urban green spaces

The available UOS were in general perceived as being sufficient to meet the needs and challenges faced by the managers. Twelve of the 14 managers reported a net increase in numbers of UOS during the past 3–5 years (the two Icelandic managers reported no change in the amount). Likewise, 12 of the 14 managers believed that this trend for an increasing amount of UOS is very likely to continue during the coming 3–5 years. Two of the 14 managers did not answer the question on future changes. Wolff and Haase (2019) described the supply of green space in European cities, (excluding Iceland), and showed that the other four Nordic countries all had an average or above average supply of m² green space per resident. Thus, the outset for the UOS managers perception is likely to be good, compared to many other UOS managers, in e.g. Southern Europe, where the green space supply in general was shown to be way below average.

Ten of the 14 managers even reported an increase in the total size of UOS during the past 3–5 years. One manager reported no change, while two managers reported a decrease in the total size of UOS and one manager was unable to answer this question. Ten of the 14 managers believed net UOS size will increase in the coming 3–5 years, two predicted no change and two did not answer this question.

The general expected increase in number and in total size of UOS was explained by the fact that new developments usually create new UOS:

"I think it (UOS provision) will increase, mostly because we are building new areas and these will require some green spaces as well. Usually, it comes with the houses, roads, schools …".

"In the newly built areas we see the size as a huge problem. Usually, we get a lot of smaller areas which we see as a problem. We can't survive on only smaller areas."

The new spaces described may be many, but are often small, and thus lack the quality and potential multi-functionality seen in larger green spaces (Jansson, 2014; Vaz Monteiro et al., 2016). According to Yu et al. (2020), the cooling effect of green spaces differs according to the

location, size and shape of the green space, while the amount of vegetation plays a significant role for UOS in terms of actually offering a cooling effect. The effects of UOS size on biodiversity are described by e. g. Dale (2018), who report that bird species richness increases with increasing size of urban green spaces. Despite an increase in the number of UOS, there was general concern among the interviewees about how many people can be expected to be supported by a specific space, as densification is increasing the number of users per UOS. Peschardt et al. (2012) found that small public UOS in dense city areas can help satisfy the need for everyday experiences, but also showed that such areas are limited to specific user groups (e.g. well-educated people aged 30–49 years), with the majority of use restricted to visits on the way home from work as a place to socialise or rest.

Statistics Sweden (SCB, 2019) show that the majority of UOS (80%) in Sweden are relatively small (0.5–3 ha), while the larger areas (<10 ha) make up only 3% of the total number, but 26% of total area, creating different points of departure for creating multi-functionality and withstanding user pressure. In addition, the densification process may be faster than the addition of sufficient amounts of new green spaces, resulting in more users per area. Thus, both the number and size of UOS need to be understood in relation to the potential use (pressure) when evaluating their ability to maintain quality and meet contemporary needs. The more people using an area, the higher the risk of conflicts between different usages, according to the managers interviewed here:

"The available space is sufficient. (But) when talking about densification, (politicians) say like 'we don't take any more green areas', but the amount of people using the areas will increase which means that the amount of green area per person is reduced. But this perspective is almost forgotten in the discussions."

"It leads to the question: When is a park full? How many people can have access to a single park as their closest?"

3.5. Perception of budgets

Overall, the managers reported ongoing new developments, but claimed that funding does not always follow long-term management. This was perceived as a major problem and may lead to an unfortunate shift of resources from existing green spaces to the newly built and prominent inner-city areas, leading to inequality issues. Another outcome of this was a change of expression in existing green spaces from intensely maintained to more nature-like, following e.g. a trend for biodiversity.

Budgets for UOS management in general were perceived as satisfactory, but with some concerns regarding the increase in new developments and sufficient allocation of maintenance budgets for these. Two of the managers specifically mentioned the difference between investment and maintenance budgets, with the latter being strained while the investment budget is good. Six managers reported having experienced strained budgets during the past 3–5 years, while the other six managers had experienced a stable or even increased budget. There was more uncertainty regarding future budgets, with around 50% of interviewees expecting an increase in their budget in the coming 3–5 years.

The UOS budgets reflected the current pressure on local government budgets due to significant demographic changes (EU, 2017). In e.g. the UK and US, maintenance budgets are being severely reduced (Neal, 2014, 2016; Randrup & Jansson, 2020). A similar, but less significant, trend for UOS budget reductions has been observed in recent studies in Sweden and Norway (Fongar et al., 2019; Randrup et al., 2017). However, in those studies green space managers in both Norway and Sweden reported an increase in green spaces and an increase in users, and saw this as a future challenge. The majority of managers in the present study had experienced an increase in budgets, and half of them expected

budgets to increase further in the near future:

> "Based on the circumstances that are given, we are quite satisfied. I mean, you can't be stupid, of course we want to have a lot of money but we are doing good."

> "At the moment, we have enough budget to maintain the areas and to do some minor changes and also fund investment in new areas."

In all cities represented by the interviewees, new developments have been ongoing for some time and the managers expected this to continue during the next 3–5 years. Such developments generate new UOS. This trend follows topical debates about the value of green spaces in general, and green infrastructure in particular (see e.g. Baycan-Levent & Nijjkamp, 2009; Hoyle & Sant'Anna, 2020). However, while new developments are funded, the managers reported a trend for related long-term maintenance budgets not to follow the expected increase in maintenance requirements, with some reporting no maintenance funding at all and others insufficient funding:

> "We get an adjustment in the maintenance budget for additional areas, but this is usually accompanied by a kick-off requirement of equivalent savings. One could say that it is a bit counterproductive."

> "The green areas are increasing by 2.2% every year, but our resources and money have not changed for five years although we have more to maintain. Also, we have more complicated areas like storm water systems that are very different and need qualitative knowledge, which means we need to buy it from somewhere else. That is more expensive. We are coming to a point where we need to say that we can't do everything you want us to do. Not with the money we have now."

It was frequently mentioned that creativity and strategic means were needed to highlight the areas requiring maintenance funding, but also to seek funding from new areas such as the social or the cultural departments. This would mean taking resources from districts that might not have a high political focus and using it for maintenance in newly built green spaces, with the risk of creating inequality concerning the distribution of green spaces.

> "It comes to a question about the equal society, the equal city. Not much is built in the outer parts of the city, but we have to take (maintenance) money from those, to use in parts with new developments. And it's rarely the groups with few resources that the new developments are aimed at. So it misallocates the resources in a way."

Maintenance budgets in some cases were reported to be at a level hindering further park developments. Some interviewees believed that it is not possible to spread existing maintenance funding any thinner between the parks:

> "Now the situation has become so bad that we have declared ourselves unable to develop new green spaces if we do not get increased budgets for maintenance. So, now other departments are beginning to raise this issue as well, as e.g. the planning department claim that we cannot build new city district without parks."

The reduction in maintenance budgets was actually sometimes seen as a new type of quality, with a new urban and wilder nature prevailing. While there is a lot to gain from this, some perceived that it could become a challenge in relation to smaller green spaces and higher user pressures:

> "Reductions in maintenance budgets will require green spaces to be maintained more efficiently, meaning that parks will look different in the future. This might not be a bad thing, and maybe even be a good thing from an ecosystem service perspective. It's in the places

where it clashes with multi-functionality and high user pressures that challenges arise."

3.6. Plans and strategies

All the Nordic countries have national legislation to support provision of green spaces (Lidmo et al., 2019), but primary regulations and decisions related to UOS are made at the local government level in all the Nordic countries and also e.g. in the UK (Randrup & Persson, 2009; Dempsey & Smith, 2014). The managers mentioned conventional and common plans, like the overall local government (municipal) plan and detailed planning, as two planning instruments always related to UOS management. As a supplement to the overall municipal plan, most managers also mentioned sectoral plans and overall strategies linked to the green sector (linking the tactical and the policy levels). In addition, specific plans related to green space management and maintenance were reported to be in place in most cities. Depending on the manager, various plans related to typologies (green spaces, trees, forest or nature), activities or user groups (recreation, sports, playgrounds) or ecology (sustainability, biodiversity, climate) were mentioned.

The managers expressed general frustration that UOS values are often considered "soft" in comparison with other values managed by local governments, e.g. traffic, overall planning and human health and well-being. Therefore, several managers expressed a wish to have more "scientific" or hard data on e.g. the smallest advisable size of a park or a minimum percentage of open space, to strengthen the argument for UOS provisioning in general.

While the overall policy documents, the municipal plan and detailed planning are mandatory and cover multiple aspects of local government planning, the other strategies mentioned are voluntary for local governments. Therefore, there was large variation in the strategies highlighted. It was mentioned that a way to receive more funding (a larger budget) is to create strategies that are eventually politically accepted.

> "A politically accepted strategy is a substantial strategic tool for the management organisation."

Most managers expressed a wish for increased Nordic (cross national) cooperation in relation to UOS management. However, the importance of securing direct relevance on a local level was often emphasised, indicating that participation in research and development projects is of interest, but often restrained due to limited resources and lack of overall political prioritisation. In general, the managers suggested that support systems on all three management levels should be developed on a Nordic level, including documentation of green space values and creation of frameworks for local development of green space policies, standards for inventorying UOS typologies or elements (trees, kindergartens etc.), and/or development of maintenance standards.

> "Every city is inventing the same types of guideline values. We put lots of energy into doing the same thing. It would be great if there were more generic data.
> A lot is common for the Nordic cities. Now these values need to be adjusted to be accepted on a political level in each city - leading to modifications and compromises. [We need] a document that is not based on local political decisions…."

3.7. Four overarching trends

Based on the PAM results, we identified four interdependent trends, or challenges, affecting UOS management in Nordic cities. These related to (i) an overall discourse in terms of densification, (ii) user perspectives, (iii) resources in terms of an increase in area, but not in budgets, and (iv) rules of the game being lacking, as facts and standards were perceived as potential tools to enhance and further promote UOS.

1. Densification, smaller areas and increased use.

Densification of urban areas was perceived as a challenge by the interviewees, as it potentially leads to smaller green spaces, while also increasing user pressure on available spaces. Increasing numbers of people using green spaces, together with a need for other vital contemporary focus areas and functions (such as storm water management and biodiversity), create a demand for multifunctional spaces. Lack of space for these different usages is increasingly forcing cities represented by the interviewees to programme UOS, limiting the possibility for more self-organised activities and thus compromising the multi-functionality (e.g. a multisports arena instead of a lawn that could also be used for leisure/picnic).

Densification was also perceived as the main driving force for increasing both the amount and net size of UOS within the cities represented by interviewees, mainly from new developments. These new green spaces were often perceived to be too small to support all the requirements on green space. Thus, the impact of densification on UOS management needs to be considered from a large-scale perspective (e.g. connectivity and networks) and also regarding how green spaces are affected (e.g. size and content), to ensure the qualities are maintained under growing user pressure.

Discourses other than densification concerned application of a holistic view to UOS (e.g. connectivity, strategic green, biodiversity), which would require a transition away from a local perspective on individual parks to a more strategic, biodiversity-driven approach in UOS management.

2. User perspectives are powerful and manifold.

Users were perceived by the interviewees as the most important stakeholders in UOS management. Users are becoming increasingly aware of the values of UOS and therefore demanding more from their surrounding environment. Use of green spaces by citizens was perceived as an important indicator for UOS quality, while feedback from users was considered helpful for understanding and guiding management needs. An important issue raised was representation in relation to actual use and feedback in relation to preferences.

The increasing pressure from densification, together with users' different needs and various political discourses (e.g. biodiversity, climate, health), is creating a trend for multi-functionality of UOS. However, increased multi-functionality is challenging in terms of securing access and overall managerial responsibility (including funding), e.g. when an area is both a schoolyard and a storm water facility. User pressure is highest in central city areas that have more hard surfaces and less vegetation, but UOS outside city centres is also developing a new appearance. At the urban periphery, managers reported an emerging trend for increasing biodiversity, while also saving funding for maintenance. This dual trend results in an increased amount of 'urban nature', less programming and thus increased multi-functionality, especially in more peripheral green spaces.

3. Total area of UOS is increasing, but budgets are not.

The area of UOS is increasing due to new developments. However, there is a need to understand available size from different perspectives. An increase in net UOS size is a valuable addition in modern cities, but it is not sufficient to support all the various needs and demands of users. Therefore, it is also vital to assess the size and distribution of the individual spaces, in order to determine the capacity of UOS to supply the desired qualities. Despite an increase in the net size of UOS, individual new green spaces were perceived by the interviewees to be too small in size to support all the different needs deriving from increasing numbers of users with a good general understanding of their right to UOS. Increasing user pressure on small UOS, especially in inner-city areas, is prompting a change in UOS appearance through use of materials able to withstand more intensive wear and tear, often leading to more hard surfaces and less vegetation.

There is reason to be concerned about future funding, especially for UOS maintenance. Lack of sufficient maintenance funding requires managers to prioritise between different UOS. Some of the managers interviewed argued that this leads to inequality, since money from the maintenance budget is diverted from existing areas (usually economically weaker areas) to newly developed areas (usually economically stronger areas).

4. Facts and politically adapted UOS strategies are needed.

All the Nordic countries have national legislation and policies to support UOS, but primary regulations and decisions related to UOS are made at the local government level. Several managers mentioned the need for assessing hard values, e.g. minimum requirements or quotas, especially when explaining the values of UOS to politicians and other local government departments. Many managers called specifically for the development of standard methods and means for assessing UOS values on national or Nordic level.

4. Conclusions

Many studies have examined provision of ecosystem services and users' perceptions of UOS, but few studies have actually asked UOS managers about their perceptions of contemporary challenges to the provision of relevant UOS. This study identified four key challenges in contemporary UOS management: Densification was perceived as a challenge in all Nordic cities represented in the survey, irrespective of country, geographical location or city size. More UOS may be created as a direct result of increased urbanisation, leading to new, but smaller spaces facing high user pressure, a higher degree of programming and smaller budgets, especially for long-term maintenance. New developments are sufficiently funded, but lack of funding for long-term maintenance is another key challenge. Engagement of users is a third key challenge for UOS managers, through the need for providing relevant UOS, often together with users. The fourth key challenge is lack of facts and documentation on the values of UOS for use in the political debate.

To confirm and develop more around these findings, a full-scale survey (questionnaire-based) should be conducted in all five Nordic countries.

Appendix A. Interview guide

Perception of role and organisation

- Can you describe your position/'location' within the organisation?
- Which pros or cons do you see with this type of organisation?

Perception of prevailing discourses

- Which discourses are prevailing today - concerning urban green spaces?

Perception of quality

- What is 'quality' in relation to urban green spaces?
- Do the urban green spaces in your city have those qualities today?
- How do you think that the quality of the urban green spaces has changed in the past 3–5 years and how do you think that the quality will change in the coming 3–5 years?
- Which qualities do you think will be most affected by such changes?

Perception of size and amount of urban green spaces

- Do you think that today's range of urban green spaces (in terms of number and size) meets the needs and challenges the city is facing?
- Have you experienced an increase or decrease in the amount (number) of urban green spaces in the past 3-5 years?
- How do you think the amount of (number of) urban green spaces will change in the coming 3-5 years?
- Have you experienced an increase or decrease in the size of urban green spaces in the past 3-5 years?
- How do you think the size of urban green spaces will change in the coming 3-5 years?

Perception of size and amount of urban green spaces

- Do you think that today's range of urban green spaces (in terms of number and size) meets the needs and challenges the city is facing?
- Have you experienced an increase or decrease in the amount (number) of urban green spaces in the past 3-5 years?
- How do you think the amount (number) of urban green spaces will change in the coming 3-5 years?
- Have you experienced an increase or decrease in the size of urban green spaces in the past 3-5 years?
- How do you think the size of urban green spaces will change in the coming 3-5 years?

Perception of budgets

- Do you consider the budget set for urban green space management to be sufficient to meet the needs and challenges the city is facing?
- Have you experienced a change in the budget in the past 3-5 years, and how do you think that the budget will change in the coming 3-5 years?

Plans and strategies

- Which strategies/plans do you use to manage urban green spaces?
- Do you work with other policies/guidelines/support (e.g. the green space factor) to ensure the creation and/or preservation of greenery during exploitation?
- If you were to have a Nordic policy or support from the EU, which could facilitate your work and contribute to greener cities, what would it involve in concrete terms?

References

Allen, M. (2018). Interviewees. In *The SAGE Encyclopedia of Communication Research Methods* (pp. 798–800). Thousand Oaks: SAGE Publications, Inc.

Arnouts, R., van der Zouwen, M., & Arts, B. (2012). Analysing governance modes and shifts – Governance arrangements in Dutch nature policy. *Forest Policy and Economics, 16*(C), 43–50.

Barton, D. N., Gulsrud, N., Kabisch, N., & Randrup, T. B. (2020). Urban open space valuation for policy-making and management. In M. Jansson, & T. B. Randrup (Eds.), *Urban open space governance and management* (pp. 129–148). London & New York. Pps: Routledge.

Baycan-Levent, T., & Nijkamp, P. (2009). Planning and management of urban green spaces in Europe: Comparative analysis. *Journal of Urban Planning and Development, 135*(1), 1–12.

Bekessy, S, White, M, Gordon, A, Moilanen, A, McCarthy, M and Wintle, B 2012, 'Transparent planning for biodiversity and development in the urban fringe', Landscape and Urban Planning, 108(2–4): 140–149.

Benchimol, J.F., A.P.D.N. Lamano-Ferreira, M.L. Ferreira, T.T.P. Cortese & H.R. Ramos (2017) Decentralized management of public squares in the city of São Paulo, Brazil: Implications for urban green spaces. Land Use Policy, 63:418-427.

Brody, S. (2013). The characteristics, causes, and consequences of sprawling development patterns in the United States. *Nature Education Knowledge, 4*(5), 2.

Buijs, A. E., Mattijssen, T. J. M., van der Jagt, A. P. N., Ambrose-Oji, B., Andersson, E., Elands, B. H. M., & Möller, M. S. (2016). Active citizenship for urban green infrastructure: Fostering the diversity and dynamics of citizen contributions through mosaic governance. *Current Opinion in Environmental Sustainability., 22*, 1–6.

Chan, C.-S., Joi Si, F., & Randrup, T. B. (2020). A longitudinal investigation of urban park management in Hong Kong: A managerial perspective. *Journal of Park and Recreation, Administration., 38*(4), 1–21.

Colding, J., Gren, Å., & Barthel, S. (2020). The incremental demise of urban green spaces. *Land, 9*(162), 1–11. https://doi.org/10.3390/land9050162.

Colding, J., Lundberg, J., & Folke, C. (2006). Incorporating green-area user groups in urban ecosystem management. *Ambio, 35*(5), 237–244.

Connop, S., P. Vandergert, B. Eisenberg, M.J. Collier, C. Nash, J. Clough & D. Newport (2016) Renaturing cities using a regionally-focused biodiversity-led multifunctional benefits approach to urban green infrastructure. Environmental Science and Policy. 62; 99–111.

Cvejić, R., Eler, K., Pintar, M., Železnikar, Š., Haase, D., Kabisch, N., & M. Strohbach (2015) A typology of urban green spaces, ecosystem provisioning, services and demands. GREEN SURGE Publication D3.1. Brussel: European Union's 7th Framework Program.

Dale, S. (2018). Urban bird community composition influenced by size of urban green spaces, presence of native forest, and urbanization. *Urban Ecosystem, 21*, 1–14.

Douglas, O., Russell, P., & Scott, M. (2019). Positive perceptions of green and open space as predictors of neighbourhood quality of life: Implications for urban planning across the city region. *Journal of Environmental Planning and Management, 62*(4), 626–646. https://doi.org/10.1080/09640568.2018.1439573.

EU. (2017). *Key figures on Europe (2017) Eurostat statistical books.* Luxembourg: Publications office of the European Union.

Fongar, C., Randrup, T. B., Wiström, B., & Solfjeld, I. (2019). Public urban green space management in Norwegian municipalities: A managers' perspective on place keeping. *Urban Forestry & Urban Greening.*. https://doi.org/10.1016/j. ufug.2019.126438.

Fors, H. (2018) User participation in public urban woodland management. Drivers and impact on green space quality. PhD Thesis. Sveriges lantbruksuniv., Acta Universitatis Agriculturae Sueciae, 1652–6880; 2018:64.

Forsten-Astikainen, R., Hurmelinna-Laukkanen, P., Lämsä, T., & Hyrkäs, E. (2017). Dealing with organizational silos with communities of practice and human resource management. *Journal of Workplace Learning, 29*(6), 473–489. https://doi.org/10.1108/JWL-04-2015-0028.

Freeman, W. J. (1991). The physiology of perception. *Scientific American, 264*(2), 78–85.

Haase, D., Frantzeskaki, N., & Elmqvist, T. (2014). Ecosystem services in urban landscapes: Practical applications and governance implications. *AMBIO, 43*, 407–412.

Haase, D., S. Pauleit & T.B. Randrup (2020) Urban open spaces and the urban matrix: elements, form and functions. In: Jansson, M. & T.B. Randrup (Eds) Urban open space governance and management. 1st edition. Abingdon, Oxon; New York, NY: Routledge. ISBN 9780367173036. Pp 30–50.

Hagemann, F.A.A., Randrup, T.B. & Å.O. Sang (2020) Challenges to implementing the urban ecosystem service concept in green infrastructure planning: A view from practitioners in Swedish municipalities. Socio-Ecological Practise Research.2. 283–296. doi:https://doi.org/10.1007/s42532-020-00054-3.

Haines-Young, R. & M. Potschin (2008) England's terrestrial ecosystem services and the rationale for an ecosystem approach. Overview report. Defra Project Code NR0107.

Hansen, R & S. Pauleit (2014) From multifunctionality to multiple ecosystem services? A conceptual framework for multifunctionality in green infrastructure planning for Urban Areas. Ambio, 4:516–529.

Hoyle, H. E., & Sant'Anna, C. G. (2020). Rethinking 'future nature' through a transatlantic research collaboration: climate-adapted urban green infrastructure for human wellbeing and biodiversity. *Landscape Research.* https://doi.org/10.1080/01426397.2020.1829572.

Jansson, M. (2014). Green space in compact cities: The benefits and values of urban ecosystem services in planning. *Nordic Journal of Architectural Research, 2*, 139–160.

Jansson, M., & Lindgren, T. (2012). A review of the concept 'management' in relation to urban landscapes and green spaces: Toward a holistic understanding. *Urban Forestry & Urban Greening, 11*(2), 139–145.

Jansson, M., N. Vogel, H. Fors, N. Dempsey, A. Buijs & T.B. Randrup (2020) Defining urban open space governance and management. In: Jansson, M. & T.B. Randrup (Eds) Urban open space governance and management. 1st edition. Abingdon, Oxon; New York, NY: Routledge. ISBN 9780367173036. Pp. 11–29.

Jansson, M., Vogel, N., Fors, H., & Randrup, T. B. (2019). The governance of landscape management: New approaches to urban space development. *Landscape Research., 44*(8), 952–965. https://doi.org/10.1080/01426397.2018.1536199.

Kabisch, N., & Haase, D. (2014). Green justice or just green? Provision of urban green spaces in Berlin, Germany. *Landscape and Urban Planning, 122*, 129–139.

Lidmo, J., A. Bogason & E. Turunen (2019) The legal framework and national policies of urban greenery and green values in urban areas. A study of legislation and policy documents in the five Nordic countries and two European outlooks. Nordregio Report 2020:3, Nordregion. DOI:https://doi.org/10.6027/R2020:3.1403-2503.

Lindholst, C., T.B. Randrup, A. Kristoffersson, M.B. Hansen & B. Persson (2017) The many outcomes from contracting out: The voice of public managers. Environment and Planning C: Politics and Space. 0(0) 1–22. DOI:https://doi.org/10.1177/2399654417733992.

Luederitz, C., E. Brink, F. Gralla, V. Hermelingmeier, M. Meyer, L. Niven, L. Panzer, S. Partelow, A-L. Rau, R. Sasaki, D.J. Abson, D.J. Lang, C. Wamsler & H. von Wehrden (2015) A review of urban ecosystem services: Six key challenges for future research. Ecosystem Services, 14; 98-112.

MEA (2005) Millennium ecosystem assessment report. Ecosystems and human well-being: Synthesis. Millennium ecosystem assessment. Washington, DC: Island Press.

Neal, P. (2014) State of UK public parks. Research report to the heritage lottery fund. June 2014. Heritage Lottery Fund, London, UK, pp. 84 (Prepared by: Peter Neal Consulting, Community First Partnership, Ben Hurley Communications, Peter Harnik, Center for City Park Excellence, Dr Ed Hobson & Ipsos MORI).

Neal, P. (2016) State of UK public parks. Research report to the heritage lottery fund. 2016. Community first partnership. Heritage Lottery Fund, London, UK, pp. 124. (Prepared by: Peter Neal Consulting).

Peschardt, K. K., Schipperijn, J., & Stigsdotter, U. K. (2012). Use of small public urban green spaces (SPUGS). *Urban Forestry & Urban Greening, 11*(3), 235–244.

Pickett, S. T. A., Cadenasso, M. L., & Grove, J. M. (2004). Resilient cities: Meaning, models, and metophors for integrating the ecological, socio-economic, and planning realms. *Landscape & Urban Planning, 69*, 369–384.

Prinz, W. (1990). A common coding approach to perception and action. In O. Neumann, & W. Prinz (Eds.), *Relationships between perception and action.* Berlin, Heidelberg: Springer.

Qiao, X., Kristoffersson, A., & Randrup, T. B. (2018). Challenges to implementing sustainable stormwater management from a governance perspective: A- literature review. *Journal of Cleaner Production., 196*, 943–952.

Randrup, T. B., & Jansson, M. (2020). Strategic management of urban open spaces. Chapter 11 in. Jansson, M. & T.B. Randrup (Eds) Urban open space governance and management. 1st edition. Abingdon, Oxon; New York, NY: Routledge. *ISBN, 9780367173036*, 190–203.

Randrup, T.B., J. Östberg & B. Wiström (2017) Swedish green space management - The managers perspective. Urban Forestry & Urban Greening. 28;103–109 https://doi.org/10.1016/j.ufug.2017.10.001.

Randrup, T. B., & Persson, B. (2009). Management of public green space in the Nordic countries – Development of a new strategic green space management regime. *Urban Forestry & Urban Greening, 8*(2009), 31–40.

Salomaa, A., Paloniemi, R., Kotiaho, J. S., Kettunen, M., Apostolopoulou, E., & Cent, J. (2017). Can green infrastructure help to conserve biodiversity? *Environment and Planning C: Government and Policy, 35*(2), 265–288.

SCB. (2019). https://www.scb.se/publikation/40314.

Scott, M., Lennon, M., & Douglas, O. (2019). *Mainstreaming green infrastructure as a health-promoting asset* (pp. 151–156). May: Town and Country Planning.

Seiwert, A., & Rößler, S. (2020). Understanding the term green infrastructure: Origins, rationales, semantic content and purposes as well as its relevance for application in spatial planning. *Land Use Policy, 97*, 104785. https://doi.org/10.1016/j.landusepol.2020.104785.

Soga, M., & Gaston, K. J. (2016). Extinction of experience: The loss of human-nature interactions. *Frontiers in Ecology and the Environment., 14*, 94–101.

Stigsdotter, U. K., Ekholm, O., Schipperijn, J., Toftager, M., Kamper-Jørgensen, F., & Randrup, T. B. (2010). Health promoting outdoor environments - Associations between green space, and health, health-related quality of life and stress based on a Danish national representative survey. *Scand J Public Health, June 2010, 38*(4), 411–417.

Tett, G. (2016). *The silo effect: The peril of expertise and the promise of breaking down barriers.* Simon & Schuster Paperbacks, ISBN 978-1-4516-4473-9.

UN (2014). World's population increasingly urban with more than half living in urban areas. United Nations. [May, 2020] www.un.org/en/development/desa/news/population/world-urbanization-prospects-2014.html.

Vaz Monteiro, M., Doick, K. J., Handley, P., & Peace, A. (2016). The impact of greenspace size on the extent of local nocturnal air temperature cooling in London. *Urban Forestry & Urban Greening, 16*, 160. https://doi.org/10.1016/j.ufug.2016.02.008.

WHO. (2016). *Urban green spaces and health - A review of evidence (2016).* Copenhagen: Regional Office for Europe.

WHO. (2017). *Urban green spaces: A brief for action.* Copenhagen: Regional Office for Europe. euro.who.int.

Wolff, M., & Haase, D. (2019). Mediating sustainability and liveability—Turning points of green space supply in European cities. *Frontiers in Environmental Science.* https://doi.org/10.3389/fenvs.2019.00061.

Yu, Z., Yang, G., Zuo, S., Jørgensen, G., Koga, M., & Vejre, H. (2020). Critical review on the cooling effect of urban blue-green space: A threshold-size perspective. *Urban Forestry & Urban Greening, 49*, 126630. https://doi.org/10.1016/j.ufug.2020.126630.