Walking the Dog – a motive for daily walks, illustrated for the urban park and Natura 2000 area Bosjes van Poot (city of The Hague, The Netherlands)

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Abstract
In an urban environment, parks are a popular area for walking dogs. In The Hague we used visual counts and a survey to investigate the numbers and characteristics of both visitors and dogs as well as their spatial dispersal pattern in Bosjes van Poot, an urban park with 'multiple use'. Almost completely surrounded by an urban environment, Bosjes van Poot is a 30 ha dune area open to pedestrians only. It is also a Natura 2000 site, protected by the European Habitats Directive. In this paper, we aim to show some results of our study and compare them to a national study on Dutch mobility to discuss the implications for management and design of urban pedestrian facilities in Bosjes van Poot.
For the study, four visual counts were done on a Sunday and a Tuesday in the spring and fall. Sunday counts in spring and fall showed between 1,700 and 1,800 daily visitors with around 950 dogs. Visitor volumes on Tuesdays were considerably lower: roughly 1,350 visitors in May (with 1,200 dogs) and 730 in October (with 700 dogs). According to our survey, respondents with a dog visited the area several times a day (48%) or a week (46%) and throughout the year. Respondents without a dog visited the area less frequently; for the majority, that was several times per week (32%). Most respondents with a dog visited the area between 8 and 10 am and between 12 and 6 pm and stayed 45 minutes, on average. Respondents without a dog generally stayed a bit shorter, about 38 minutes. On weekdays, their visits were equally spread between 10 am and 6 pm, and on Sundays, most visits occurred between 12 and 3 pm. From these random samples, the annual number of visits was indicatively calculated: 439,000 visitors with 344,000 dogs, both with a “bandwidth” of about 20%.
By combining the visual counts and the survey data, a spatial dispersion of the visits over the area’s six sectors with different habitat types for nature conservation was estimated. Two sectors were heavily visited, but three others were not accessed by half of the people and dogs visiting the area. This difference allows for a zoning in the management plan, considering the different motives of visitors with and without dogs as well as differences in the carrying capacity of the habitat types.
The presence of 1.8 million of dogs in the Netherlands, many of them living in an urban surrounding and walked twice a day, generates several trips on foot in residential areas, especially to and from leash-free areas for dogs, such as Bosjes van Poot. This deserves careful consideration when planning pedestrian facilities in residential areas.

Brief biography

Dr ir Catharinus F. (Rinus) Jaarsma is an associate professor in Land Use Planning at Wageningen University in the Netherlands. He investigates 'sustainable road safety', 'rural traffic calming' and 'habitat de-fragmentation for the fauna' for rural road networks. He is also interested in mobility management for recreational traffic in nature reserves and other scenic areas. The study on walking the dog in Bosjes van Poot falls under the latter theme and has been commissioned by the city of The Hague.

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Introduction

Walking the dog, generally twice a day, is an important reason for taking a stroll in residential areas. For public health reasons and to avoid conflicts with other users of the public space, such as playing children, walking the dog is subject to a battery of regulations and restrictions. See, for example, Figure 1, with the regulations for the borough of Segbroek in the municipality of The Hague. Not surprisingly, the scarce off-leash areas in an urban environment are a popular destination for dog walkers because of the freedom from constraint for both walker and dog. Jaarsma et al. (2008) investigated the numbers and characteristics of both visitors and dogs as well as their spatial dispersal pattern in such an off-leash area, Bosjes van Poot, the urban park with 'multiple use' in The Hague. This 30-hectare dune area is almost completely surrounded by an urban environment and access is restricted to pedestrians. It is also a Natura 2000 site, protected by the European Habitats Directive.

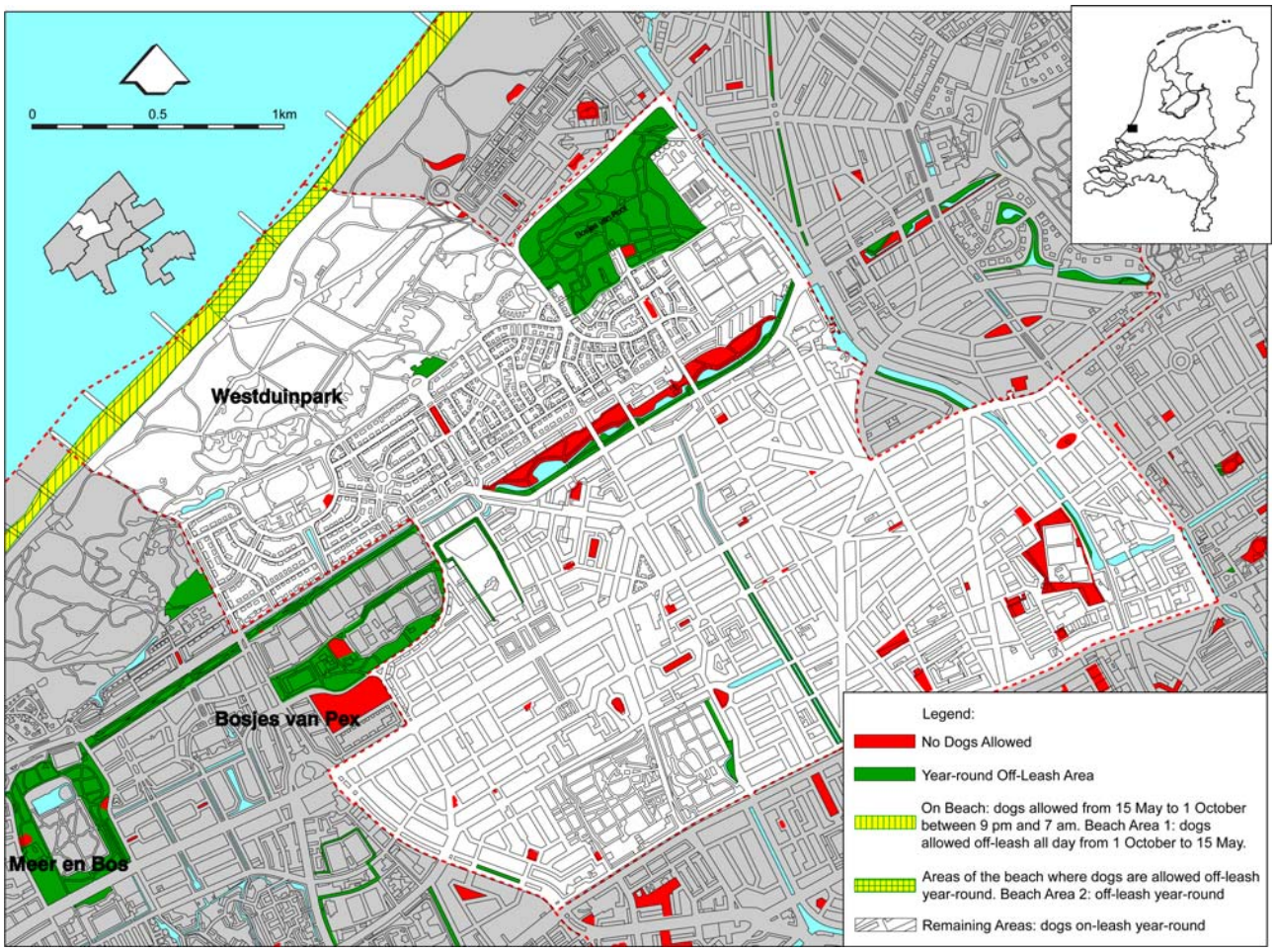

Figure 1. Regulations for dog-walking in the borough of Segbroek (City of The Hague, 2009)

This paper aims to show (1) the results of this study related to the role of walking in total daily mobility for the Dutch population and (2) some implications of our data for policy, management and design of pedestrian facilities in urban parks and neighbouring residential areas.
This paper is structured as follows. In the next section we further introduce the research area, Bosjes van Poot, and the methods applied. We then present the main results of the study, followed by a discussion on characteristics of dog walking compared with walking as a transport mode and what this means for the research area's management. Finally, we draw some conclusions, placing the results in the wider context of mobility on foot in an urban environment.

The research area: Bosjes van Poot

Bosjes van Poot is managed by the municipality of The Hague and fulfils at least three different functions. The 30-hectare dune area with 'multiple use' is (Jaarsma et al., 2008):

1. designated as a leash-free area for dogs, where, on the paths, owners are obligated to clean up after their dogs (Figure 1);
2. an urban park with a dense network of footpaths accessible to pedestrians from 15 entrances (Figure 2). These allow the area to be accessed from all directions through at least 1 entrance;
3. a nature reserve. In 1990, the government designated the area as "Westduin Park Nature Reserve", along with the bordering Westduin Park (ca. 200 ha; the areas are separated by Duindorp, a residential area, and the Nieboerweg, a municipal trunk road, see Figures 1 and 2). For this reason, these areas have been brought under the purview of the Nature Conservancy Act. They were then designated as Natura 2000 areas in 2008.

The status "Westduin Park Nature Reserve", the green policy of The Hague and the European regulations for Natura 2000 require that the area manager draw up a management vision and a management plan. Management is aimed at sustainably managing the internationally valuable and protected habitats. For this reason, the area has been divided into 6 sectors (Figure 2). Every sector has at least 1 entrance for area visitors. Because of possible zoning measures, the area has been sectored by vegetation types with the area's most vulnerable parts as the smallest sectors (sectors II to V, see Figure 2). These sectors comprise Jonge Duinen (Young Dunes), overgrown with dune grassland (Bakker & ten Haaf, 2008), and a few oak clusters (Quercus robur) (Den Ouden et al, 2008).

The research methods

Visual counts and a user survey form the core of the research on visitor flows (Jaarsma et al., 2008). For this paper, an additional literature search was done on walking as a mode of transport.
Visitor flows, expressed in both people and dogs, were observed in 4 visual counts on a Sunday and a Tuesday in the spring and fall. In spring, all 15 entrances were covered from 7 am to 9 pm (420 hours of observation in total). From these observations it was concluded that about 75% of all people and dogs entered the park within approximately half of the total 420 observation hours. Because of this, the counts in fall were limited to the busiest sites and hours: 11 sites between 9 am and 8 pm on a Tuesday and 10 sites between 9 am and 9 pm on a Sunday. To estimate the numbers in fall between 7 am and 9 am (equivalent as observed in spring), the number of people and dogs observed in fall were recalculated using a factor between 1.18 and 1.30. This factor was based on the ratio of observed numbers of people and dogs and of incoming and outgoing passers-by in spring between 7 am and 9 pm and the new time interval in fall. The 4 visual counts provided insight into the number of visitors and the number of dogs, differentiated by size. These data were used to estimate the yearly flows.
In fall a user survey was given to the area visitors to be filled out at home. The survey asked the visitors about their motives and origin, the nature and the frequency of their visits as well as their spatial dispersal pattern. From the 277 respondents, 192 (69%) indicated that they usually had a

dog with them while 85 respondents (31%) indicated that they usually did not have a dog with them.

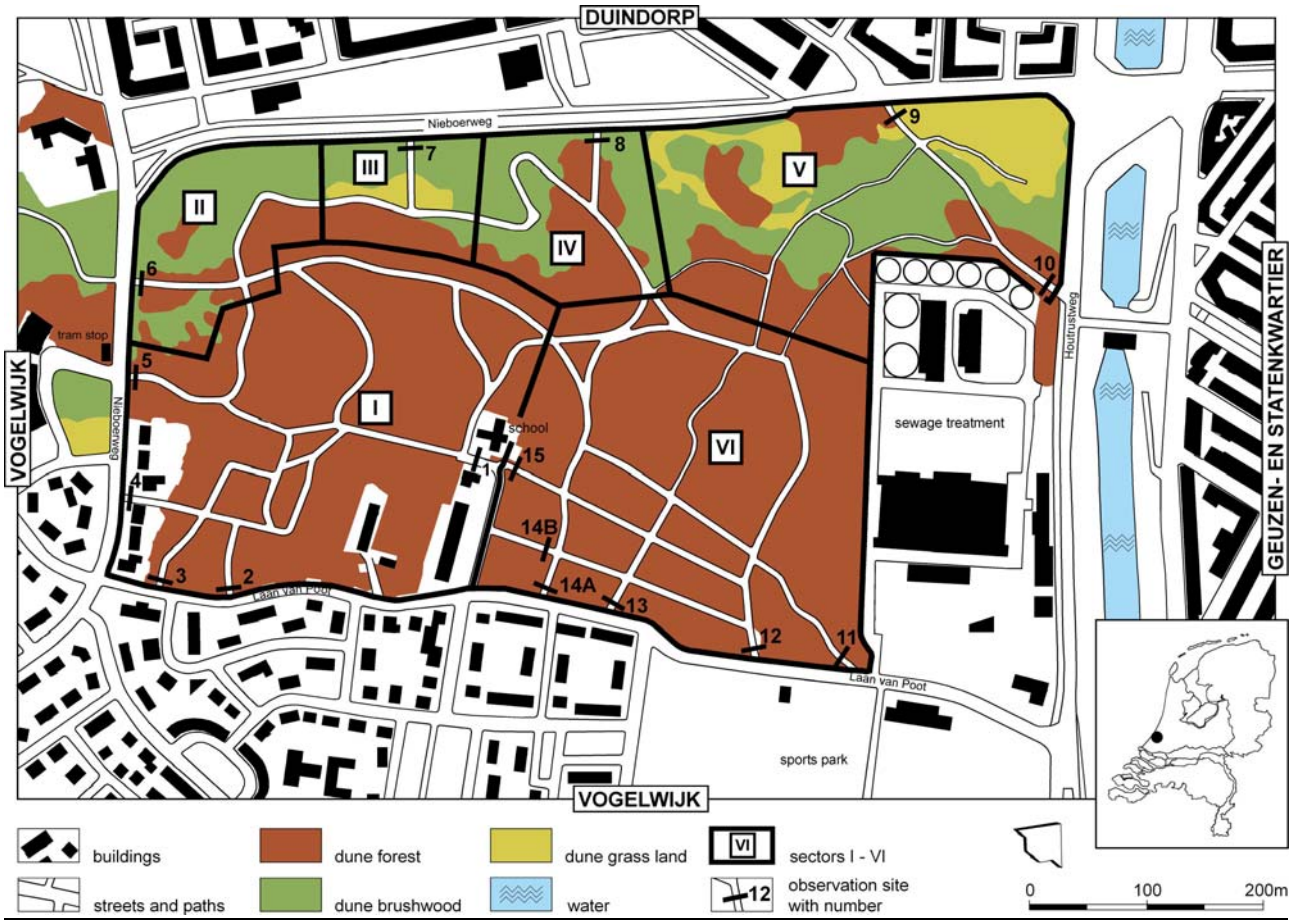

Figure 2. Natura 2000 area Bosjes van Poot in the borough of Segbroek (Figure 1) bordered by the wards of Vogelwijk, Duindorp and Geuzenkwartier/Statenkwartier in the urban environment of The Hague. Bosjes van Poot has 15 entrances (location of the visual counts), 3 vegetation habitat types and spatial division into 6 sectors (I-VI)

To compare the walking with and without dogs in the Bosjes van Poot with walking as a mode of transport, we used the results for "trips on foot" from the Dutch Ministry of Transport's 2008 "mobility research" project (V&W/Rijkswaterstaat, 2009). This project provides information on daily mobility for the Dutch population (expressed in number of trips and kilometres travelled per person per day), specified by motive and mode. It is based on registered personal trip data during one day per respondent for a sample of 40,000 respondents in the Netherlands in one year.

Results

Estimated visitor flows per year

Sunday visual counts in spring and recalculated visual counts in fall showed between 1,700 and 1,800 daily visitors with around 950 dogs. Visitor volumes on Tuesdays were considerably lower: roughly 1,350 visitors in May (with 1,200 dogs) and 730 in October (with 700 dogs). The proportion of people and dogs on Sundays (about 1: 0.55) and Tuesdays (about 1:0.90 to 0.96) differed considerably. From these outcomes we conclude that visits on weekdays are dominated by dog walkers. In contrast, on Sundays, when the visitor level is higher, many visitors to Bosjes van Poot come without a dog.

The visual counts were executed at the entrances where only pedestrians are allowed. From the survey we learned that 51% of the dog walkers visit Bosjes van Poot as part of a mobility chain

combining different modes of transport into one trip to walk the dog. These visitors arrive at Bosjes by car (40%), bicycle (10%) or public transport (1%). Only 23% of the visitors without dogs show a chain of modes, combining their walking activity in Bosjes van Poot with travel by car (7%), bicycle (14%) or public transport (2%). This means that 49% of the dog walkers and 77% of the other visitors come directly on foot to the Bosjes van Poot.
From these 4 random samples, the annual number of visits was indicatively calculated, assuming that Saturday takes the average position between workdays and Sunday. The annual total was estimated by multiplying the number of workdays, Saturdays and Sundays by the observed average for the type of day in question. This resulted in 439,000 visitors with 344,000 dogs. On average, this means 1,200 visitors and 940 dogs per day. The dogs were classified by weight and visitor percentage of dogs: small dogs (less than 10 kg, 25%), medium-sized dogs (between 10 and 25 kg, 34%) and large dogs (25 kg and over, 41%).
Because of the random sample's uncertainty, a "bandwidth" for the visit was also determined. This amounts to about 20%. These values were calculated by applying the lowest and the highest workday count to all workdays (Jaarsma et al., 2008).

Frequency of visits

The frequency of visits was calculated from the survey, distinguishing between dog walkers and other visitors (Figure 3). From the visual counts we learned that other visitors were mostly concentrated on Sundays and probably on Saturdays as well.

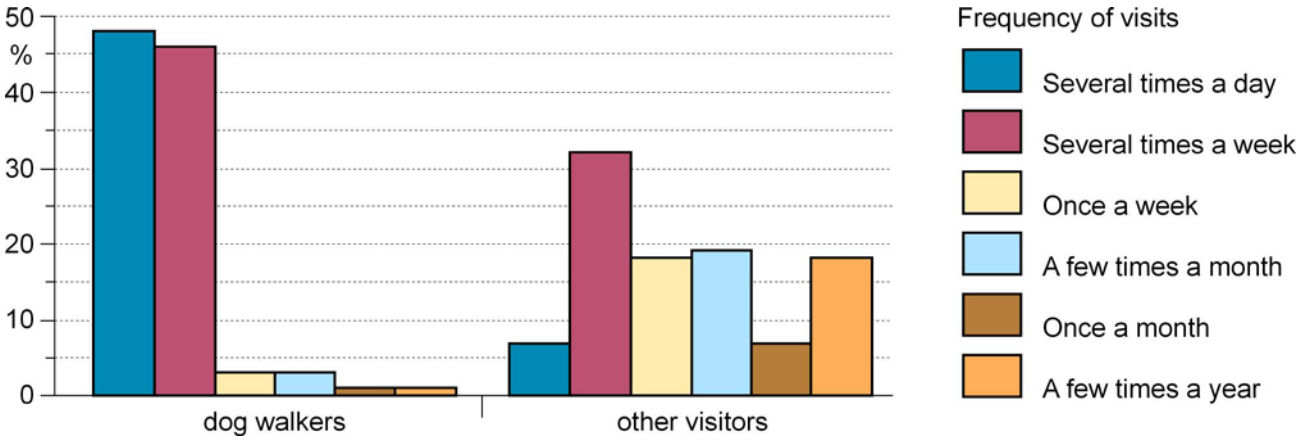

Figure 3. Visitor frequency for dog walkers (left) and other visitors (right) from Jaarsma et al., 2008

The figure shows that almost all of the visitors with a dog indicate that they visit Bosjes van Poot several times a day (48%) or several times a week (46%). The percentage of visitors with a dog that visit the area once a week, or even less, is low (8%). These high visitor frequencies are connected to the need to walk the dog because respondents without a dog state that they visit the area less frequently: the portion of visitors without a dog who go several times a day is only 7%. Most respondents without a dog indicate that they visit the area several times a week (32%), followed by a few times a month (19%), and once a week and a few times a year (both 18%).
The need to walk the dog daily also comes out in the question on the seasons when respondents visit Bosjes van Poot. More than 95% of the visitors with a dog indicate that they visit the area year round, including winter, while in winter less than 85% of the visitors without a dog visit the area.

Time of day and duration of visit

Respondents with a dog usually visit the area around the same time each day, with little difference between weekdays, Saturdays and Sundays. Almost half of the visitors come to the area between 3 and 6 pm (42-46%). Many respondents with a dog indicate that they also visit Bosjes van Poot from 8 to 10 am (about 35%). The portion of visitors with a dog before 8 am on weekdays is

much higher than in the weekend. Noteworthy is the “dip” in visits between 10 am and 12 pm, which is sharper on weekdays than in the weekend. Most respondents without a dog visit Bosjes van Poot between 10 am and 6 pm both on weekdays and on Saturdays, and also between 6 and 9 pm on weekdays. On Sundays, the busiest period for this group is between 12 and 3 pm (45%).

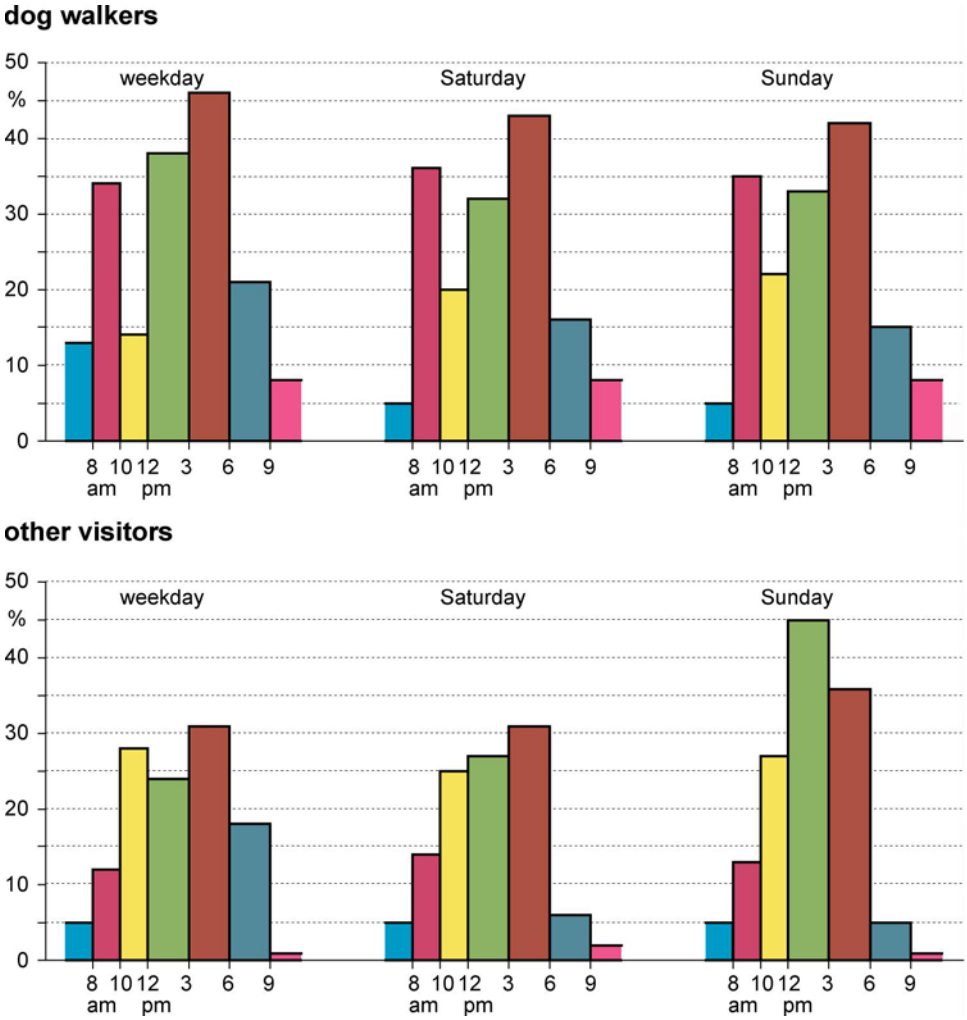

Figure 4. Frequency of visits by time of day on weekdays, Saturdays and Sundays (from left to right) for dog walkers (above) and other visitors (below), elaborated from Jaarsma et al., 2008. Note: In classifying visits during the day, respondents could give several answers, making the total percentages larger than 100%.

Figure 5 (elaborated from Jaarsma et al., 2008) gives the length of stay in Bosjes van Poot for respondents with or without a dog. Striking is the difference in length of stay between the two groups of respondents. Respondents with a dog indicate that they mostly stay 30 minutes or an hour in Bosjes van Poot (respectively, 42% and 41%). Most respondents without a dog indicate that they stay less; a large percentage indicate that they do not stay longer than 15 minutes or half an hour in the area (both times score 32%).

Because the length of stay is registered in classes of 15 minutes or more, the average length of stay in Bosjes van Poot cannot be calculated precisely. On the basis of estimated averages per class, we estimate that visitors with a dog stay 40 to 51 minutes while those without a dog remain 34 to 42 minutes. Compared with the remaining visitors, the visitors with a dog stay a bit longer (about 6 to 9 minutes) in the area.

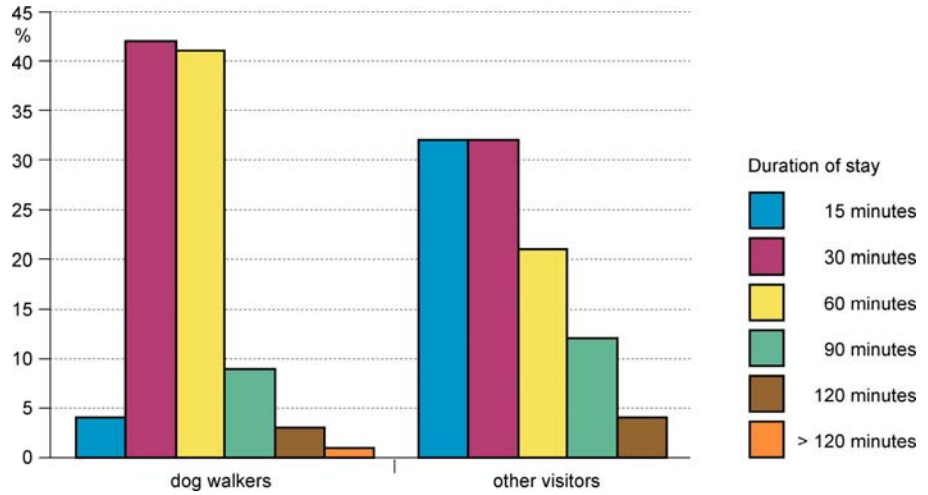

Figure 5. Duration of stay in Bosjes van Poot for dog walkers (left) and other visitors (right)

Spatial dispersion of the visitors

By combining the visual counts and the survey data, a spatial dispersion of the visits was mapped for the area's six sectors (Figure 6). The south-eastern sector is the most visited, followed immediately by the north-eastern. In 88% of the cases, respondents with a dog indicated that they visited both sectors. The three sectors on the Duindorp-side are visited by approximately half of the people and dogs visiting the Bosjes van Poot area (Jaarsma and Kooij, 2010).

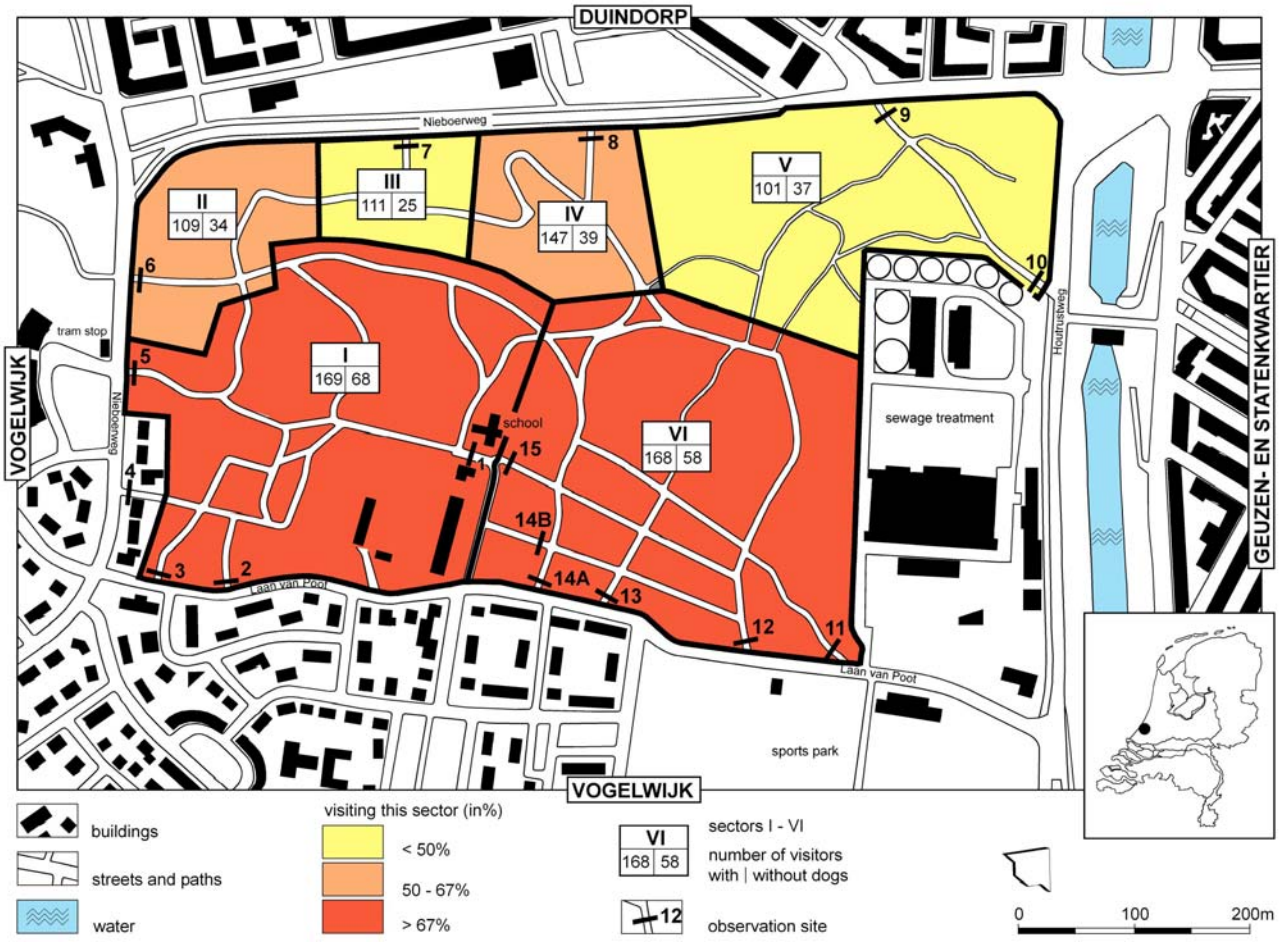

Figure 6. Indicative spatial dispersal of total visit (in per cents of N=277) and volume of visits with a dog (absolute number, N=192) and without a dog (idem, N=85), per sector (I-VI).

Implications for policy, management and design

The role of dog walking within total mobility on foot

From general data on Dutch mobility (V&W/RWS, 2009), we learned that from a total average of 2.94 trips per day, the Dutch make, on average, 0.55 trips on foot, covering a distance of 0.56 km per person per day (from a total for all modes of 33.3 km per day). For 16.2 million people, this amounts to 8.9 million trips on foot per day. Detailed data on the presence of dogs are unknown, but approximately 1.8 million dogs live in the Netherlands (LNV, 2010). Assuming that every dog is walked twice a day, on foot, 3.6 million trips on foot are made for this purpose each day. This covers roughly 40% of all daily trips on foot as registered in the mobility research. (In our study, we did not consider walking multiple dogs at once, considering this to be balanced more or less by dogs escorted by more owners when walking).

In Table 1, we distinguish between motives for trips on foot: 39% are made for mandatory motives and 30% for 'taking a stroll/walking'. The remaining 31% is for 'making visits'(11%), 'other social/recreational' (11%) and 'other' (9%). In the research of V&W/RWS, motive was categorized by the interviewee. In our opinion, 'taking a stroll/walking' seems to be the best choice for walking the dog. However, an interviewee could have made another choice and categorized this activity into other non-mandatory motives, especially 'other social/recreational' or 'other'. Table 1 also shows that 42% of kilometers travelled on foot (0.25 km per person per day) are made for 'taking a stroll/walking' and 35% for mandatory motives.

Table 1. Mobility on foot per person per day by motive and total daily mobility for all modes (*in italics*) in the Netherlands in 2008: number of trips generated (left) and distance travelled (right) (V&W/Rijkswaterstaat, 2009)

Motive	Number of trips	In per-cents	Kilometres travelled	In per-cents
Mandatory motives	0.22	39	0.21	35
Visit/ stay	0.06	11	0.04	7
Other social/recreational	0.06	11	0.07	12
Taking a stroll/walking	0.17	30	0.25	42
Other non-mandatory motives	0.15	9	0.03	5
Total daily mobility on foot per person	0.56	100	0.62	100
Total daily mobility, *all modes*, per person	*2.94*		*30.95*	

Time and duration of dog walking compared with total mobility on foot

Figure 7 shows the distribution of trips on foot by time of day (expressed in per cents of the daily total; total for 24 hours = 100%) from the Dutch mobility study in 2008. Some periods, for example 9 am -12 pm, cover more than 1 hour. These volumes have been equally distributed to the relevant hours. We compare these national data for all motives with the visitor data from Figure 4, combined for a weekly average and totalled for 24 hours = 100%.

Early birds (walkers before 8 am) are rare, except for dog walkers. Trips on foot are concentrated between 8 and 9 am (9%), and between 12 and 4 pm (between 9% and 11% per hour). Dog walkers peak earlier in the morning, between 8 and 10 am (10%), and later during the late afternoon (between 3 and 6 pm, 9%). Compared with dog walkers, other visitors to Bosjes van Poot come later. They peak between 10 am and 12 pm (12%) and hardly visit the area after 9 pm. Visitors with a dog stay, on average, an estimated 40 to 51 minutes. The national mobility study shows that 68% of the trips on foot take only 1 to 15 minutes, where 90% of these trips take 30 minutes maximum. In short, dog walkers in Bosjes van Poot take considerably more time for this activity than the Dutch generally do for their trips on foot.

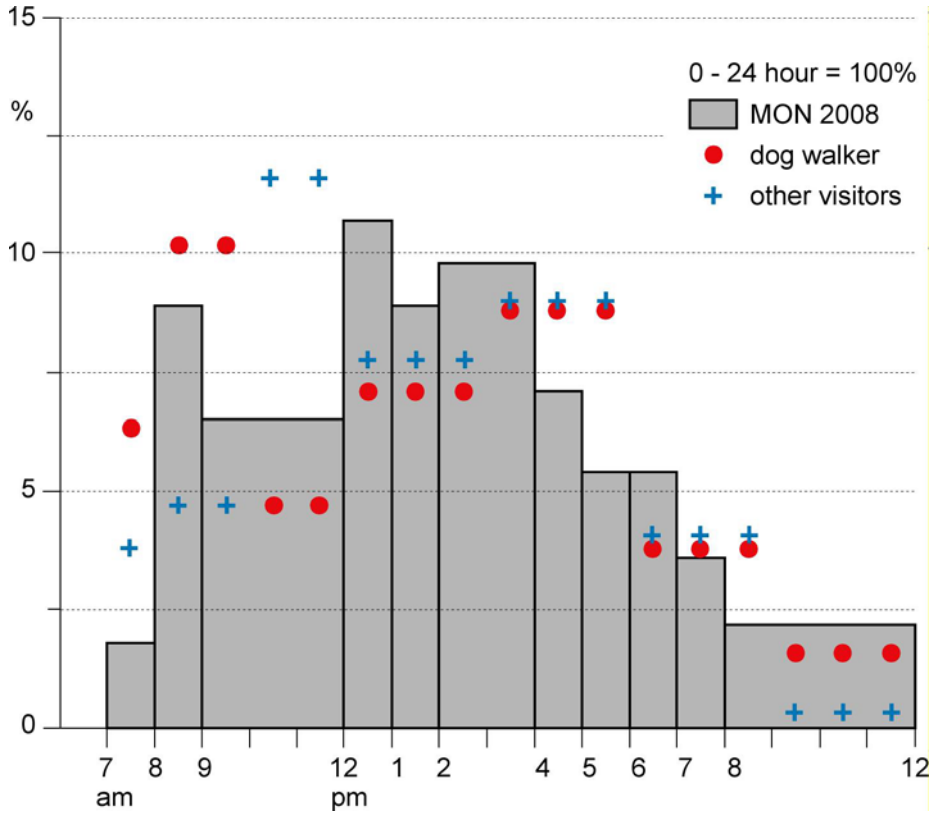

Figure 7. Day pattern of national mobility on foot (all motives; MON 2008) compared with day patterns of dog walkers and other visitors in Bosjes van Poot.

Application of the data for visitor policy and management

Visitor management of nature reserves and parks is normally aimed at people and based on visitor flows. When these areas are also designated Natura 2000 areas, a management plan has to be designed to balance conservation objectives with social and economic interests (Beunen, 2010). In a densely populated country like the Netherlands, even Bosjes van Poot, a relatively small urban park (30 ha) where many people walk their dogs has been designated a Natura 2000 area, albeit combined with a much larger neighbouring dune area (205 ha). As a consequence, a management plan for Bosjes van Poot has to be designed. Because of Bosjes van Poot's role in dog care, special attention should be given to the policy on walking dogs in the area, especially to cleaning up faeces and to leashing. Consulting actual users, investigating their ambitions (see Jaarsma and Kooij, 2010), and gathering reliable data on visit volume (people and dogs) and its spatial dispersion are corner stones in this process.

In this context, the combination of the visitor data in Figure 6 with the vegetation habitat types in Figure 2 provides tools for the visitor management. From a nature protection viewpoint, the 4 sectors II to V cover the area's most sensitive parts while sectors I and VI are comparatively less fragile. Sectors II to V also have the largest differences in altitude. The visitor data show that these parts are less visited than the forested sectors I and VI. Because this forested landscape is less fragile, it is favourable for visitor traffic from a nature management perspective. While visitors naturally go to sectors I and VI, carefully redesigned paths and entrances may help attract even more dog walkers to use only these parts of the area with the highest carrying capacity.

Application of the data for urban design and pedestrian facilities

Visitor counting in this study was motivated by the need to design a management plan following EU regulations. The result, 1200 visitors on foot per day, stresses the importance for a good technical lay-out of pedestrian facilities. Comparing the data on mobility with the number of dogs in the Netherlands, a considerable part of total reported mobility on foot must be related to dog

walking. A study in the US states that, in high-density urban environments, demand has increased for a place where people and their dogs can interact and exercise. Evaluation of four dog parks indicated that a substantial number of respondents perceived the benefits of a park for the dog's physical well being and for building a sense of community among dog walkers. Such findings will help guide the future planning, design, and evaluation of dog parks (Lee et al., 2009). However, not only the park but also the pedestrian facilities both inside and outside the park in the neighbouring residential areas should be considered in these processes.

Conclusions

Placing the results of the study on walking in Bosjes van Poot in the wider context of mobility on foot in the national mobility research, we conclude the following:

1. On a national basis, walking the dog twice a day covers roughly 40% of all daily trips on foot as reported in the Dutch mobility research. However, dog walking has not been marked as a specific motive in the research and may therefore have been underreported.
2. Compared with the national daily pattern of travel on foot, dog walkers in Bosjes van Poot are more active in the morning between 7 and 10 am and during the late afternoon between 4 and 6 pm.
3. Dog walkers stay in Bosjes van Poot, on average, 40 to 51 minutes. This is rather a long time compared with the duration of trips on foot (with all motives) in the national research, 90% of which last 30 minutes or less.

Related to the implications of the study for policy, management and design, we conclude the following:

1. The visitor monitoring in Bosjes van Poot has provided corner stone data (visit volumes and its spatial dispersion) for designing the management plan for this Natura 2000 area.
2. The data on spatial dispersion of visitor flows already show a kind of zoning in the present situation, with less visitors in the parts of the area most valued by nature conservation.
3. Average daily numbers of 1200 visitors also call for attention outside the area: a qualitative good pedestrian network connecting the neighbouring residential areas to the paths in Bosjes van Poot will improve accessibility on foot.

Our final conclusion is that urban parks such as Bosjes van Poot generate considerable visitor flows with many visitors coming on foot and especially on weekdays and many of them walking a dog. This deserves careful consideration when planning pedestrian facilities in or near residential areas.

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