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Willingness to travel to avoid recreation conflicts in Danish forests

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ABSTRACT

Conflicts among forest visitors have direct effects on the quality of a recreational experience. As the number of visitors to forests close to residential areas increases, as well as the number of different activities, so does the potential for perceived conflicts. According to the literature, expanding knowledge of conflict characteristics and their causes is important for recreation planners and managers who aim to reduce conflicts.

In the present study, different forest user groups were identified and categorised according to their pursued activities, and for each group, causes of conflict were identified. Furthermore, a choice experiment was constructed to estimate the distance visitors are willing to travel to encounter few visitors as opposed to many visitors, and thereby potentially experience fewer conflicts. Comparing the marginal willingness to travel (WTT) of different user groups suggests that some groups have a WTT further than the average to reach a forest with 'Few' visitors. The average WTT to reach a forest area with 'Few' visitors. 'Mountain bikers,' 'Peace and nature lovers' and 'Horse riders' are willing to travel 4 km more than the average per visit to reach a less crowded forest. At the other end of the scale, we find that people who are doing physical exercise are willing to travel 2 km less than the average to reach a less crowded forest.

Introduction

Problem statement

There is a current political focus on encouraging people to visit forest areas to pursue recreational activities which, among other things, is assumed to increase health and wellbeing (Olsen et al., 2013). For example, a correlation study in Sweden by Grahn and Stigsdotter (2003) suggests that there is a lower rate of reporting sickness caused by stress by people who visit forests regularly (Miljøministeriet, 2012). An epidemiological correlation study implemented in the Netherlands by Maas et al. (2006) illustrated that residents in neighbourhoods with rich green space are likely, on average, to enjoy better general health. In 2007/08, Danish forests received approximately 70 million visits by the adult (15–78 years) population (Jensen, 2012a). As many people live in cities, the already intensive recreational use of the areas may become even more intensive with the encouragement of increased activity. This may cause problems in terms of crowding (Absher and Lee, 1981; Shelby et al., 1989; Hall and Cole, 2007), which may also increase the risk of conflicts. Therefore, an issue faced by managers is how to design forests and other green spaces so as to distribute the recreational use spatially. This paper contributes first by investigating the existence of potential conflict among different forest user groups, which identifies who disturbs whom, and to what extent. Secondly, we investigate how much further people are willing to travel (WTT) to avoid meeting (too) many forest visitors and thereby avoiding potential conflicts. Third we investigate whether some user groups are more willing to travel further than others.

Currently in Denmark, afforestation is closely linked to an increasingly urban society. This development is concerned with the emergence of a new urban condition in which the city can no longer be considered as an established area surrounded by open countryside, but is instead increasingly becoming part of growing urban regions comprising both the city and countryside (Clemmensen et al., 2010). According to Konijnendijk (2008), this means that forestry must take other disciplines into account including urbanism and landscape architecture. There is a trend that forests which are situated close to residential areas are becoming more and more attractive as sites for (more diverse) recreational activities (Jensen, 2012b). This illustrates the increasing importance of local (urban) outdoor recreation for Danes. Increasing the number (and diversity) of visitors will increase the probability of crowding and encounter rates, which reduce the quality of an outdoor experience

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(Absher and Lee, 1981; Shelby et al., 1989; Kleiber, 2001; Hall and Cole, 2007). The presence of conflicts is one indicator that the social carrying capacity of recreation and tourism settings has been exceeded.

In Denmark, the average adult citizen visits forests 33–38 times per year (not adjusted for exaggeration) for recreational purposes (Jensen and Koch, 2004; Jensen, 2012a). Most previous studies show that the Danish population will ask for significant compensation for reductions in their current access rights to forest and other habitats (Jacobsen et al., 2012). Denmark is characterised by a relatively high number of inhabitants on a relatively small and intensively exploited land area; 5.4 million inhabitants on 43,000 km^2 of which 11% is forest and 10% is other nature areas (Danish Forest and Nature Agency, 2002). The forests in the area are dominated by broadleaved tree species and can predominantly be characterised as urban forests within a mixed landscape of agriculture. In the study area, state forest districts and many private forest districts have established numerous facilities for public use such as playgrounds, simple camp sites, information boards, visitor centres, barbecue sites, and bird watching towers. Each year, more than 500,000 people in total participate in a range of activities organised by forest rangers, while nature schools and forest kindergartens are becoming increasingly popular (Danish Forest and Nature Agency, 2002).

According to Jensen (1999), different types of forest visitors, presumably with different needs, visit Danish forests. Among the pursued activities, approximately two-thirds of forest visitors had gone for a walk during their visit. Just over half had "enjoyed nature", while exercising, and riding and walking the dog were activities selected by 10–15% of the visitors. Relatively few visitors to the forest (1–2%) had engaged in activities such as riding, hunting, or fishing (Jensen and Koch, 2004). Bell et al. (2007) show that in densely populated countries, out-group conflicts tend to dominate (e.g., Belgium, Denmark, and Germany). This may happen because there are often many (different) user groups competing for space (Vedel et al., 2009).

Recently, the Danish Nature Agency has reported conflicts among different forest users (Søderlund, 2012) at several places in the state forests. Sharp nails have been hammered into tree roots on mountain biking tracks in an attempt to discourage bikers. Not only do metal nails present a high risk of puncture and throw, they may also present a danger to both forest animals and people as well. The setting-up of ropes across mountain bike routes has also been reported. The Agency reports forest user complaints of mountain bikers and group cyclists who often shout to each other to warn when there are walkers on the path, which disturbs people who are walking in the forest for peace and quiet (Stenar, 2012). Consequently, the agency has launched an awareness campaign for proper behaviour in the nature ('Nice by nature'/'Flink af natur') in cooperation with The Danish Outdoor Council and the Sports Confederation of Denmark in 2014, which illustrates an increased need for knowledge for forest planners and managers to be able to handle trends in (urban) outdoor recreation which are in tune with forest user preferences.

There has been a recent political focus on improving the quality of recreation, e.g. by avoiding conflicts, out-group conflicts in particular. This has been done by establishing trails targeted for different user groups in selected areas (Danish Forest and Nature Agency, 2009; Vedel, 2010). But the individual is also likely to avoid conflicts. Some visitors are more averse to perceived conflicts than others, and one coping strategy for recreationists is to avoid crowded forests, and thereby potential conflicts. For example, forest user groups who feel disturbed may shift the time of visit from weekends to weekdays or off-peak time periods (e.g. Hammitt and Patterson, 1991). Recreationists may also decide to visit an alternative location either within the same recreational area (i.e. intra-site displacement) or visit completely different recreation settings (i.e. inter-site displacement) (e.g. Hall and Shelby, 2000; Johnson and Dawson, 2004). If they do so, they may be willing to travel further to avoid potential conflicts. Thus, the distance people are willing to travel to avoid conflicts may be an indicator of how important they perceive the conflict to be, and thus the travel cost may even be an indicator of the economic value of it.

Several studies have focused on the crowding and conflict perception in various tourism and recreational areas in countries such as the United States, Australia, and New Zealand (Shelby et al., 1989; Vaske et al., 2002; Manning et al., 1999; Inglis et al., 1999). In Europe, there has been relatively little focus on the relationship between crowding and conflicts (Arnberger and Haider, 2007; Arnberger and Mann, 2008; Jensen, 2006), despite the fact that the population is dense in many areas. Therefore, the current study contributes by providing empirical evidence of visitors' preferences and willingness to travel to avoid crowding and thereby the potential for conflicts.

Definition of crowding and conflict

Conflicts in recreation have been categorised into two classifications: (i) interpersonal conflicts which occur as a result of goal interference when one or more persons disturb or affect the goal of another person and (ii) social value conflicts which mainly happen as a result of contradictory views about the social acceptability of different behaviours in specific recreation settings (Vaske et al., 2007). According to the second classification, conflicts do not necessarily require people to be in physical proximity to one another. Therefore, conflicts may be two different constructs: actual conflicts and perceived conflicts. Perceived conflicts may be felt due to different psychological, social and environmental factors. Investigating perceived conflicts would be a required step in conflict management in order to reach a balanced *status quo* (Jenkins and Pigram, 2013). Therefore, this study aims to investigate the presence and causes of perceived conflicts.

The presence of many people in an area can exacerbate the negative feeling of potential conflicts – when experienced as crowding. Research has documented that high visitor density leads to high encounter rates, which may result in crowding and a reduction in the quality of an outdoor experience (Absher and Lee, 1981; Shelby et al., 1989; Hall and Cole, 2007). Crowding is a negative evaluation of a particular density of people in an area (Stokols, 1972; Rapoport, 1975; Kuss et al., 1990). Arnberger and Haider (2005) state that crowding is an individual's subjective experience. Jacob and Schreyer (1980) and Owens (1985) attempt to distinguish conflict and crowding from a goal oriented social and psychological perspective. According to them, social interrelationships and differences among users is the root of the problem rather than the actual physical influence they may have on one another. According to Owens (1985), crowding is considered as an instant reaction to present conditions and is therefore temporary.

Conflicts are more persistent and stable beyond a particular visit. Owens (1985) suggests that the conflict itself is an experience which can be measured on a scale from dissatisfaction and frustration to confrontation. It may or may not regulate actual behaviour.

Following Owens (1985), we look at conflicts as a 'persistent' concept, and therefore we ask people for their *general view* of disturbance from other people. In contrast to many other studies (e.g. Vaske et al., 2000, 2007; Thapa and Graefe, 2003) that focus on the actual encounters, we mainly take the occurrence of disturbance into account. We do not get a good measure of the actual experienced conflict(s), but rather a measure of the perception of conflicts. We use crowding as an indicator of the *potential* of conflicts. Here we follow Jacob and Schreyer (1980) who argue that crowding is an individual's subjective judgement that, e.g. there are too many

people. So 'too many' may refer to a varying number of people depending on the specific individual and situation. Therefore, we do not use actual numbers of visitors, but rather terms like 'Few' and 'Many'. Just how many 'Few' are may be individually perceived, but the relevant measure we are looking at is how willing people are to travel to avoid the perceived crowding and thereby the potential of conflicts.

According to the literature, there are several types of conflict among participants in similar or different types of outdoor recreation (see Manning and Ciali, 1980; Manning et al., 1999; Manning, 2011 for reviews). Conflicts between users engaged in different activities (e.g., Hikers versus Mountain bikers) are known as 'out-group' conflicts, whereas conflicts between participants engaged in the same activity (e.g., Hikers versus Other hikers) are known as in-group conflicts (Manning et al., 1999). We follow this notation and identify 'in-group' as well as 'out-group' conflicts by asking people for their general view on disturbance from others. We use the term 'disturbance,' which addresses the user's emotional feeling about a particular environment or situation, to identify perceived conflicts.

Methodology

Choice experiment method

The travel cost method has been widely used to value recreation since the 1960s (e.g. Phaneuf and Smith, 2005; Clawson and Knetsch, 1966; Zandersen et al., 2007), while crowding has been a topic in travel cost methods (cf. reveal preference approach) since the 1970s (e.g. Cicchetti and Smith, 1976; Tratalos et al., 2013). Since the 1990s, the stated preference method choice experiment has been widely used to value environmental issues, including recreation (e.g. Adamowicz et al., 1998; Campbell et al., 2013).

An advantage of the stated choice experiment (CE) method compared to the travel cost method is that it allows the *ex ante* evaluation of policies. Therefore, we apply this approach and we ask respondents to choose between different distances from their home to a site and number of forest visitors. CE has been used widely to value different recreational options, e.g. willingness to travel further to reach better cross-country skiing conditions (Sælen and Ericson, 2013) and individual-specific preferences for recreational use of different forest types in Lorraine (Northeastern France) (Abildtrup et al., 2013). Arnberger et al. (2010) also use a choice experiment with a latent class approach, which investigates urban forest visitors' preference heterogeneity for social conditions in Vienna and Sapporo.

Another and related advantage of the stated preference method over the revealed travel cost method is the prevention of multicollinearity in the attribute levels. Multicollinearity may be a problem because forests may be rather similar due to, for example, similar climatic conditions in an individual's choice set. Furthermore, the problem of endogenous attribute levels can be avoided (Hanley et al., 2002; Von Haefen and Phaneuf, 2008; Whitehead et al., 2008). If people choose their residential location based on their preferences for forest recreation, among others, the travel distance attribute will be endogenous (Parsons, 1991). Acknowledging that the actual choice of where to go for recreation is contingent upon where people live and thereby what correlated choices they have, in this study we are after what they would do if they had the option – as this may be valuable information for managers.

Travel cost studies typically use the distance travelled as input factor, while the willingness to travel (WTT) is typically used as numeraire in a choice experiment. WTT can be directly converted to willingness to pay if the travel costs per kilometre can be estimated. In the current study, we are mainly interested in the extra distance travelled to provide guidance for policy makers on the design of recreational infrastructure. Therefore, our main results are measured in kilometres, although we also convert the result into to a monetary measure in order to relate it to welfare economics studies as other authors have done (e.g. Sælen and Ericson, 2013).

Data collection and survey design

The data were collected through an internet-based questionnaire managed by the survey institute 'Analyse Denmark' during July–August 2012. We received 1200 completed questionnaires. Respondents were asked about their motivation for going to the forest as well as their pursued activities. Respondents were also asked whether they found the activities of other visitors disturbing. The questionnaire (obtainable from authors upon request) was designed using the results from two focus group interviews and pre-tests. Some modifications to the draft questionnaire were included based on the feedback.

The final questionnaire began with a section which included questions about the frequency of visit and the recreation activities respondents were pursuing in forests to identify the different forest user groups. This was followed by questions about which activities carried out by other visitors respondents found disturbing. Since we are examining the *perceived* disturbance and conflict, levels were provided in qualitative terms: 'Often', 'Sometimes', 'I meet them, but they don't disturb me', and 'I never meet them'. These results are used to answer the first research question. In addition, respondents were asked if they were disturbed by people who were engaged in the same activity as them. This would address the potential of in-group conflicts.

Subsequently, respondents were introduced to the choice experiment (CE) section where the results are used to estimate different forest user groups' WTT to avoid crowding and thereby potential conflicts.

Finally, respondents were asked follow-up questions on their socio-demographic characteristics. (In the same questionnaire, respondents received a larger CE regarding different conservation measures used for another study (Bakhtiari et al., unpublished work). However, as it followed the current crowding CE, we expect the WTT-results to be unaffected.)

Choice attributes and levels

Each choice task consisted of two alternatives and the opportunity to choose to visit the forest or not. An example is shown in Fig. 1. The attributes of each alternative were the number of visitors encountered ('Few', 'Many') and the distance travelled from the respondents' home to the forest (2, 5, 10, 15 km). Using a nine-point Likert scale to measure crowding (e.g., Shelby et al., 1989; Jensen, 2003) is a common practice in the crowding and conflict literature. Focusing on respondents' perceptions of crowding, we chose a simpler approach and used just two levels.

Using eight (2^*4) alternatives, all combinations were possible and they were matched together by using NGENE software, optimising for *d*-efficiency for multinomial logit modelling (Scarpa et al., 2008). These were divided into four blocks to give two choice tasks per respondent.

Econometrics estimation

CE is a stated preference technique that has been extensively used in the past decade in environmental valuation (Louviere et al., 2000; Bennett and Blamey, 2001).

Your preferred forest to visit!

Assume you have the option to visit forest A or forest B. They are identical* in most aspects but different in terms of:

1-Number of people you meet during your forest visit

2-The distance from your home

Look at following choices (choice 1 and choice 2), which forest would you choose to visit?

	Forest A	Forest B	None of these
Number of visitors	Many visitors	Few visitors	
Distance from your home(KM)	5 KM	10 KM	
Your choice (choose only one option)	☐	☐	☐

* Identical in terms of e.g. forest facilities and forest user types, forest covers and so on.

Fig. 1. An example of a choice task given to the respondents.

The random utility model is the basis for estimation and can be formally described as:

$$U_{ij} = V_{ij}(t_j, x_j, z_i) + \varepsilon_{ij} \quad (1)$$

where U_{ij} is the utility of individual i, by paying a cost equal to t (e.g., income tax, or in this case travel distance) to achieve the good described by alternative j. V_{ij} is the deterministic part of U_{ij} and depends on income; x_j, the characteristics of the good, and z_i, socio-economic characteristics of the individual. The term ε_{ij} is stochastic, which means that its variation cannot be observed by the researcher (Train, 2003). We assume it to be independent and identically distributed random variables (IID).

Assuming a linear function for U_{ij} and collecting all the arguments in the vector x_{ij} for alternative j and individual i, we can write:

$$U_{ij} = \text{ASC} + \beta_1 * Few + \beta_2 * distance + \varepsilon_{ij} \quad (2)$$

where β is a vector of parameters.

The specification in Eq. (2) parameterises utility in preference space. Thus, the implied WTT for each attribute is the estimated ratio of the coefficient 'β' of the attribute divided by the travel distance coefficient, which is assumed to have a fixed distribution: WTT = β_1/β_2. To allow for heterogeneity in the distribution of both parameters, we estimate it in willingness-to-pay space (Train and Weeks, 2005), whereby the parameter estimates can be interpreted directly as the WTT to encounter 'Few' instead of 'Many' forest visitors. Thus, the utility can be rewritten as:

$$U = \beta_2 \left[distance + \theta_1 * \text{ASC} + \theta_2 * Few \right] + \varepsilon \quad (3)$$

where θ_i is β_i/β_2.

Assuming the error term ε_{ij} is IID extreme value distributed (see Hausman and McFadden, 1984), and that x is a vector of attributes and $\sum$ is the corresponding vector of estimated parameters, the probability of choosing alternative k among j alternatives by individual i, is, according to Train (2003):

$$P_i(k) = \frac{\exp(\tilde{\theta}_i x_{ij})}{\sum_j^J \exp(\tilde{\theta}_i x_{ij})} \quad (4)$$

Because we work in WTT space, we avoid the issue of scaling (see Train and Weeks, 2005). (Here the term 'WTT-space' was used to address willingness to travel. However in the literature the general term in WTP-space.)

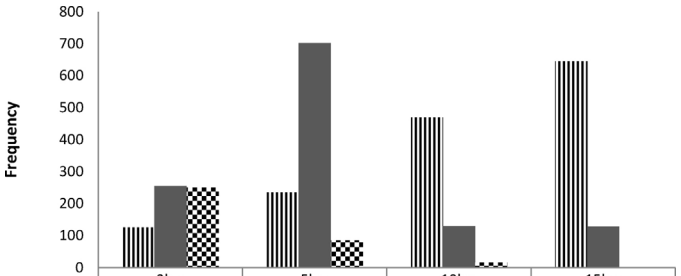
Estimating respondents' WTT away from perceived crowding gives us the average WTT to decrease crowding in a forest. In the survey, we were interested in distinguishing different user groups. So they were defined based on 31 statements related to forest activities (individual and group activities) where they were asked '*Have you participated in or would you have liked to take part in some of the following activities within the last year, when you visited the forest?*'

Many forest visitors engage in different activities at different visits to the forest. Therefore, they may fall into more than one of the above mentioned categories (31 presented categories). Thus, in order to avoid multicollinearity in our model, we use factor analysis to identify those user groups which have correlation and merge them into larger groups.

Results

User group attitudes for different activities in forests: 'Who disturbs whom?'

The estimation of respondents' perceived disturbance at different levels shows that 249 out of the 1200 total interviewees (21%)



	2km	5km	10km	15km
Status que	126	235	470	645
Few	255	702	130	128
Many	251	85	16	0

Fig. 2. Distribution of forest choice in relation to number of visitors and distance.

often felt disturbed by visitors during their forest visits. In addition, 700 (58%) indicated they have sometimes been disturbed during their visits. Only 37 (3%) answered they had not been disturbed thus far. The rest, 214 respondents (18%), chose the option 'I don't know'.

Figure 2 shows the frequency of choices of forest over distance in relation to the number of visitors. When the distance is 2 km, the number of respondents who chose to go to a forest with 'Few' and 'Many' visitors is very similar, but as the distance increases, respondents mostly chose forest with 'Few' visitors. *Status quo* addresses the number of respondents who chose not to visit forests, but instead stayed at home even though they were offered one of the shorter distances (2 or 5 km) in their choice tasks.

The result of the *t*-test (Table 1) shows that there is no statistically significant difference ($p = 0.4$) among frequency of men and women who stay at home within different age groups.

Table 2 illustrates which user groups often felt disturbed by other user groups during their visits last year. Keeping a threshold of 20% for the disturbance rate among user groups (the dark grey fields), the table shows that 'Mountain bikers', 'Horseback riders', 'Runners', 'Group-runners', 'Dog walkers' are considered the most disturbing groups by at least two other user groups in the forests.

The light grey cells in Table 2 and Table A in Appendix 1 refer to in-group conflicts – showing that runners have the highest frequency of 'in-group' disturbance.

With regard to socio-demographic variables, the results show that people in the age group 50–70 years ($p < 0.05$) felt significantly more disturbed by people than other age classes. Likewise, men felt more disturbed by people than women ($p < 0.05$).

Willingness to travel to avoid crowding and potential conflicts in forests

To estimate WTT to avoid conflicts, we specify a utility function where different user groups are interacted with the variable 'Few' in order to identify heterogeneity in the preferences. The larger user groups/groups disturbing are the ones used, cf. Table 2.

The results of the factor analysis (Appendix 1, Table B) of the user groups show that among the categories, the groups who are 'Observing animals and plants', 'Enjoying the peace and quiet', 'Gathering mushrooms and berries', and 'Going for a walk' loaded on one factor. Thus, we merged these groups and called the new group 'Peace and nature lovers'. Also, 'Having a barbeque and using stove' and 'Going for a picnic' loaded on another factor, so we merged them and called the new group 'Picnickers'. 'Running and group-running' also merged in one group called 'Exercise group'. Note that we did not include the 'Dog walker' group in our model for WTT estimation because people who go to the forest for a walk cannot be distinguished from people who walk with dogs. Therefore, we merged the 'Dog walker' group with 'Going for a walk' to avoid multicollinearity in our model.

Internal consistency of each factor was estimated using Cronbach's alpha (Cronbach, 1951), which indicates a high internal consistency, in general, values of 0.70 are recommended as the minimum level of Cronbach's alpha (Kline, 1993).

The final utility function can therefore be written as:

$$\begin{aligned} U_{ij} = {} & (\alpha_j + \theta_{1i}(distance)_j + \theta_{2i}(Few) + \theta_{3i}(Few * \text{Mountain biker})_j \\ & + \theta_{4i}(Few * \text{Peace and nature lover})_j \\ & + \theta_{5i}(Few * \text{Excercise group})_j + \theta_{6i}(Few * \text{Horse rider})_j \\ & + \theta_{7i}(Few * \text{Picnicker})_j + \theta_{8i}(Few * \text{Cyclist})_j \\ & + \theta_{9i}(Few * \text{Overnight})_j) + \varepsilon_{ij} \end{aligned} \quad (5)$$

Distance refers to distance travelled to the forest and *Few* addresses 'Few' visitors in the forest whom respondents meet during the visit in contrast to 'Many'.

The WTT space model is estimated through BIOGEME using 15,000 iterations with the CFSQP algorithm (Bierlaire, 2003). The results in Table 3 directly show the WTT for each attribute.

As seen in the table, the alternative specific constant (ASC) is significant and negative, showing respondents have a positive WTT to visit a forest rather than stay at home, regardless of the characteristics of the visit. The average marginal WTT for forests with few visitors is significant with a positive sign, showing that on average respondents are more willing to travel to be in a forest with few visitors compared to a forest with many visitors.

To analyse the differences of WTT between the different user groups, we look at the interaction between each user group and the attribute *few visitors*.

As seen in Table 3, the groups 'Mountain bikers', 'Peace and nature lovers', and 'Horse riders' have an extra marginal willingness to travel (WTT) of 4 km, 4.3 km and 4.4 km, respectively, in addition to the average preferred travel distance of 6 km, to reach to a forest with 'Few' visitors. At the other end of the scale, we find that respondents who exercise (Exercise group) have a negative marginal WTT of a magnitude of 2 km.

The marginal WTT for groups of 'Picnickers', 'Cyclists' and 'Overnighters' is not significantly different from the average WTT.

Discussion and conclusion

Due to increased recreational use in certain areas, the present study addresses the issue of perceived conflicts among different forest user groups. We asked people for their general view of disturbance from visitors. We focused on the occurrence of *feeling* disturbed. It is therefore not a measure of the experienced conflicts, but rather a measure of the *perception* of conflicts. We used crowding as an indicator for the *potential* of conflicts. We therefore

Table 1
Characteristics of respondents who chose to stay at home despite having the option to choose minimum distance.

Age	Gender						Total
	18–28	29–39	40–50	51–60	61–70	71–99	
Female%	16	14	24	23	22	1	100
Male%	5	15	23	27	29	0	100

Table 2
Percentage of disturbing user groups and groups who often feel disturbed in the case study area during the past year.

	Disturbing user groups											
Disturbed Group	Mountain biker	Working in the forest	Observing animals and plants	Gathering mushrooms and berries	Making barbeque and using stove	Horseback riders	Runner	Group runner	Kindergarten and school class (education)	People playing ball game	Playing children	Dog walker
Mountain biker	12.20	2.44	0.00	0.00	12.20	4.88	17.07	4.88	4.88	7.32	4.88	29.27
Working in the forest	13.64	4.55	4.55	2.27	4.55	9.09	11.36	6.82	4.55	18.18	4.55	15.91
Observing animals and plants	21	1.5	2	1.5	4.5	13	21.5	20.5	2.5	2.5	3.5	21
Gathering mushrooms and berries	22	2	1	1	6	11	21	23	3	5	6	13
Having a barbeque and using stove	10.53	5.26	10.53	5.26	0.00	10.53	15.79	15.79	5.26	5.26	5.26	10.53
Horse riders	30.8	0.0	0.0	0.0	7.7	15.4	7.7	7.7	0.0	23.1	0.0	7.7
Runner	21.05	0.00	1.05	1.05	5.26	5.26	21.05	15.79	3.16	4.21	7.37	14.74
Group runner	20.5	12.8	2.6	2.6	5.1	7.7	6.4	15.4	5.1	7.7	7.7	14.1
Enjoying the peace and quiet of nature	21.6	1.6	1.2	1.2	5.7	11.0	15.9	20.8	4.1	5.3	4.1	7.3
Going for a picnic	22.2	3.7	2.5	0.0	7.4	6.2	23.5	19.8	2.5	3.7	8.6	9.9
Biking	22.9	0.8	1.7	0.8	4.2	8.5	21.2	20.3	3.4	3.4	4.2	8.5
Going for a walk	22.5	1.5	1.5	1.1	1.8	21.8	22.2	24.0	1.8	1.5	1.8	11.3
Overnight stay in the forest	10.3	3.4	3.4	0.0	0.0	13.1	13.8	6.9	3.4	24.1	3.4	6.9
Other users	4.3	8.7	8.7	0.0	0.0	8.7	8.7	8.7	13.0	13.0	17.4	8.7

used terms like ‘Few’ and ‘Many’ instead of the actual number of visitors. People’s perception of just how many ‘Few’ is may vary, but the relevant measure we examined was how willing people are to travel to avoid crowding and thereby the potential of conflicts. We find that 21% of the total sample stated that they had ‘often’ felt disturbed either by their ‘own’ user group or other user group types during their last visit. This is evidence for the presence of some kind of conflict.

Jenkins and Pigram (2013) state that there is a linkage between the importance of gender/age in leisure and outdoor recreation and the feeling of disturbance. This pattern was also present in our results since people in the age group 50–70 years ($p < 0.05$) felt significantly more disturbed by other people than other age classes, while men felt more disturbed than women ($p < 0.05$).

Of the different user groups in our sample, respondents who are categorised as ‘Peace and nature lovers’ expressed that they felt disturbed more often than other user groups. This is in line with Stewart and Cole (2001), who found that visitors seeking solitude and silence experienced the most negative effect from disturbance due to crowding. Some visitors are more averse to crowds than

Table 3
WTT estimates using WTT space model.

Attributes	WTT (confidence interval) (km/visit)		Standard error	WTP[a] (DKK/visit)
Few visitor	β	6*** (5.09; 6.09)	0.05***	24***
	σ	0.005***	0.08***	–
Distance	β	**−1.07***** (0.972; 1,16)	**0.05*****	–
	σ	**0.2***** (0.19; 0,21)	**0.1*****	–
ASC	β	−2.13*** (−2.28; −1.97)	0.08***	–
Few * Mountain biker	β	4*** (1.64; 6.35)	1.2***	24***
Few * Peace and nature lovers	β	4.3*** (3.22; 5.37)	0.55***	25.2***
Few * Exercise group	β	−2*** (−0.94; −3.05)	0.54***	−10
Few * Horseback rider	β	4.4*** (0.87; 7.93)	1.8***	28.4***
Few * Picnicker	β	0.3	0.6	1.2
Few * Cyclist	β	0.04	0.5	0.8
Few * Overnighters	β	2.4	0.1	0.16
AIC/N		1.2		
ρ_2		0.44		
LL		−2031		
N		1200		

Bold indicates distance which is a payment vehicle variable.

[a] The monetary value of WTT estimation is based on the total transport cost per km in Denmark which is 4 DKK/km (1 DKK = 0.18 USD) (Federation of Danish Motorists – FDM).

*** $p < 0.01$.

others, while within the site the crowd-averse have a tendency to move furthest away from points of access (Chambers and Price, 1986). One way to avoid conflicts is to more effectively distribute people in space and time, e.g. through the location of facilities. To do so it is important to know how far people are willing to move. Therefore, using CE, the present study investigated how many additional kilometres each forest user group is willing to travel to reach a forest with 'Few' visitors as opposed to 'Many' to avoid meeting (too) many forest visitors and thereby avoiding potential conflicts. The distance travelled was chosen directly as the payment vehicle, therefore respondents stated their willingness to travel, WTT, to avoid crowding and potential conflict (see Abildtrup et al., 2013; Sælen and Ericson, 2013). By applying a CE, the WTT further to encounter fewer visitors was estimated.

On average, respondents are willing to travel 6 km further to reach a forest with 'Few' visitors compared to a forest with 'Many' visitors. Assuming a total transport cost of 4 DKK/km results in 24 DKK/visit. In general, respondents have a negative preference (WTT) for increasing travel distance. This is in line with studies by Tyrväinen (1999, 2001), Jensen and Koch (2004), and Degenhardt et al. (2011), who report the positive effect of proximity of forest on the frequency of visits. Thus, increasing the distance travelled will decrease the preference for visiting a forest.

The comparison of the WTT of different user groups suggests that some groups, namely 'Mountain bikers', 'Peace and nature lovers' and 'Horseback riders', have a WTT further than the average respondent to reach a forest with fewer visitors. We find the 'Exercise group' willing to travel less than the average travel distance to reach a less crowded forest. It can be interpreted as indicating that this group of forest users, contrary to, e.g. 'Peace and nature lovers', are more willing to meet (many) other people in the forest and do not feel as disturbed. 'Picnickers' and 'Cyclists' are the ones who do not have any 'extra' travel preference than average for forests with few visitors. A possible interpretation is that since 'Picnickers' are mainly engaging in social activities, while cyclists mainly travel around the forest by bike, they are not so dependent on a specific forest site compared to 'Peace and nature lovers'.

Overall, respondents from different forest user groups preferred to travel further to reach a forest with 'Few' visitors. We identified three reaction types among different groups regarding WTT to reach a forest with few visitors. The first types are the forest users who had larger WTT than the average, which suggests that they are willing to move further to avoid others – namely 'Mountain bikers', 'Horse riders' and 'Peace and nature lovers'. The second types include those in the 'Exercise group', who were less willing to travel further than the average. This suggests that they would like/do not mind meeting many people during their visit, and their experience is not as affected by encounters, compared to groups like the 'Peace and nature lovers'. The third types include those whose WTT is not significantly different from the average WTT.

In Denmark and many other countries, there has been focus on encouraging people to go to the forest or other green spaces to exercise, and as can been seen from the results, the 'Exercise group' is not willing to travel further to avoid crowding and meeting 'Many' visitors. For groups like 'Mountain bikers', 'Horse riders' and 'Peace and nature lovers' who are willing to incur a cost (travel further) to fulfil their needs, new forest plantations could be an option as this would increase the space and thereby potentially decrease the feeling of 'Many' visitors. Another management option would be to separate different user groups by zoning, so, e.g. the 'Mountain bikers' and the 'Horse riders' are given priority in some areas–and are excluded from others for the benefit of 'Peace and nature lovers'.

In conclusion, the present study revealed that there is evidence of perceived conflict among different forest users in Danish forests which needs to be dealt with by managers. The study gives an overview of respondents' marginal utility to travel in order to avoid crowded forests and consequently avoid conflicts. Providing knowledge of the preference for reducing crowding among different forest users may help managers and planners to distribute facilities for different user groups along with their own preference, thereby increasing the level of visitor satisfaction.

Investigating conflicts among forest user groups in different forest settings was beyond the scope of this study, but would be an area for future studies to see whether forests with different characteristics such as size, tree species, topography, and facilities, show the same WTT pattern among different forest user groups or not.

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Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at http://dx.doi.org/10.1016/j.ufug.2014.08.004.

Appendix 1.

See Tables A and B.

Table A
Total number of disturbing user groups and groups who often feel disturbed in the case study area during the past year.

	Disturbing user groups												
Disturbed Group	Mountain biker	Working in the forest	Observing animals and plants	Gathering mushrooms and berries	Making barbeque and using stove	Horseback riders	Runner	Group runner	Kindergarten and school class (education)	People playing ball game	Playing children	Dog walker	**Total**
Mountain biker	5	1	0	0	5	2	7	2	2	3	2	12	43
Working in the forest	6	2	2	1	2	4	5	3	2	8	2	7	48
Observing animals and plants	42	3	4	3	9	26	43	41	5	5	7	32	210
Gathering mushrooms and berries	22	2	1	1	6	11	21	23	3	5	6	13	108
Having a barbeque and using stove	2	1	2	1	0	2	3	3	1	1	1	2	20
Horse riders	4	0	0	0	1	2	1	1	0	3	0	1	15
Runner	20	0	1	1	5	5	20	15	3	4	7	14	100
Group runner	10	10	2	2	4	6	5	12	4	6	6	11	68
Enjoying the peace and quiet of nature	53	4	3	3	14	27	39	51	10	13	10	18	255
Going for a picnic	18	3	2	0	6	5	19	8	2	3	7	8	86
Biking	27	1	2	1	5	10	25	24	4	4	5	10	122
Going for a walk	62	4	4	3	5	60	61	31	5	4	5	31	306
Overnight stay in the forest	3	1	1	0	0	7	4	2	1	7	1	2	32
Other users	1	2	2	0	0	2	2	2	3	3	4	2	24

Table B
Statements related to the forest activities pursued in forests and activities which disturb visitors. Principal component analysis, varimax rotation.

	Activities	Factor 1	Factor 2	Factor 3
Have you participated or would you have liked to participate in any of the following activities within the last year, when you visited the forest?	Overnight stay	–	–	
	Observing animals and plants	0.5292	–	–
	Gathering mushrooms and berries	0.5192	–	–
	Going for a picnic	–	0.5102	–
	Enjoying the peace and quiet of nature	0.5945	–	–
	Biking	–	–	
	Horse riding	–	–	–
	Kindergarten and school class (education)	–	–	–
	Group-running			0.5232
	Walking	0.5000	–	–
	Mountain biking	–	–	–
	Making barbeque and using stove	–	0.5102	–
	Working in the forest	–	–	
	Running			0.5421

References

Abildtrup, J., Garcia, S., Olsen, S.B., Stenger, A., 2013. Spatial preference heterogeneity in forest recreation. Ecol. Econ. 92, 67–77, http://dx.doi.org/10.1016/j.ecolecon.2013.01.001.

Absher, J.D., Lee, R.G., 1981. Density as an incomplete cause of crowding in backcountry settings. Leis. Sci. 4 (3), 231–247.

Adamowicz, W., Boxall, P., Williams, M., Louviere, J., 1998. Stated preference approaches for measuring passive use values: choice experiments and contingent valuation. Am. J. Agric. Econ. 80 (1), 64–75.

Arnberger, A., Haider, W., 2005. Social effects on crowding preferences of urban forest visitors. Urban Forest. Urban Green. 39 (2), 345–365.

Arnberger, A., Haider, W., 2007. A comparison of global and actual measures of perceived crowding of urban forest visitors. J. Leis. Res. 3 (3), 125–136.

Arnberger, A., Mann, C., 2008. Crowding in European forests: a review of recent research and implications for forest management and policy. Forestry 81 (4), 571–599.

Arnberger, A., Aikoh, T., Eder, R., Shoji, Y., Mieno, T., 2010. How many people should be in the urban forest? A comparison of trail preferences of Vienna and Sapporo forest visitor segments. Urban Forest. Urban Green. 9, 215–225.

Bell, S., Tyrväinen, L., Sievänen, T., Pröbstl, U., Simpson, M., 2007. Outdoor recreation and nature tourism: a European perspective. Living Rev. Landscape Res. 1, 1–46.

Bennett, J., Blamey, R., 2001. The Choice Modelling Approach to Environmental Valuation. Edward Elgar Publishing Limited.

Bierlaire, M., 2003. BIOGEME: a free package for the estimation of discrete choice models. In: Proceedings of the 3rd Swiss Transportation Research Conference, Ascona, Switzerland.

Campbell, D., Vedel, S.E., Thorsen, B.J., Jacobsen, J.B., 2013. Heterogeneity in the WTP for recreational access: distributional aspects. J. Environ. Plan. Manage., 1200–1219.

Chambers, T.W.M., Price, C., 1986. Recreational congestion: some hypotheses tested in the forest of Dean. Rural Stud. 2 (1), 41–52.

Cicchetti, C.J., Smith, V.K., 1976. The Cost of Congestion. Cambridge, MA, Ballinger.

Clawson, M., Knetsch, J.L., 1966. Economics of Outdoor Recreation. Resources for the Future, Washington, DC.

Clemmensen, T.J., Daugaard, M., Nielsen, T., 2010. Qualifying urban landscapes. JoLA 5 (2), 24–39.

Cronbach, L.J., 1951. Coefficient alpha and the internal structure of tests. Psychometrika 16, 297–334.

Danish Forest and Nature Agency, 2002. The Danish National Forest Programme in an International Perspective. Ministry of Environment, Division of Forest Policy of the Danish Forest and Nature Agency, Copenhagen.

Danish Forest and Nature Agency, 2009. Friluftskortet (overview of recreational facilities etc. in Danish state forests), Retrieved from: http://friluftskortet.dk (02.04.09).

Degenhardt, B., Frick, J., Buchecker, M., Gutscher, H., 2011. Influences of personal, social, and environmental factors on workday use frequency of the nearby outdoor recreation areas by working people. Leis. Sci. 33, 420–440.

Federation of Danish Motorists in Denmark (FDM), 2009. Retrieved from: http://jyllands-posten.dk/motor/ECE4083757/din-bil-koster-dig-3-76-kr-per-kilometer/ (01.07.14).

Grahn, P., Stigsdotter, U., 2003. Landscape planning and stress. Urban Forest. Urban Green. 2, 1–18.

Hall, T., Cole, D., 2007. Changes in the Motivations, Perception and Behaviors of Recreation Users: Displacement and Coping in Wilderness. RMRS-RP-63. Department of Agriculture, Forest Service Rocky Mountain Research Station, Fort Collins, CO.

Hall, T.E., Shelby, B., 2000. Temporal and spatial displacement: evidence from a high use reservoir and alternate sites. J. Leis. Res. 32, 435–456.

Hanley, N., Wright, R.E., Koop, G., 2002. Modelling recreation demand using choice experiments: rock climbing in Scotland. Environ. Resour. Econ. 22, 449–466.

Hammitt, W.E., Patterson, M., 1991. Coping behaviours to avoid visitor encounters: its relationship to wild land privacy. J. Leis. Res. 23 (3), 225–237.

Hausman, J., McFadden, D., 1984. Specification tests for the multinomial logit model. Econometrica 52 (5), 1219–1240.

Inglis, G., Johnson, V., Ponte, F., 1999. Crowding norms in marine settings: a case study of snorkeling on the Great Barrier Reef. Environ. Manage. 24, 369–381.

Jacobsen, J.B., Lundhede, T.H., Thorsen, B.J., 2012. Valuation of wildlife populations above survival. Biodivers. Conserv. 21, 543–563.

Jacob, G., Schreyer, R., 1980. Conflict in outdoor recreation: a theoretical perspective. J. Leis. Res. 12, 368–380.

Jenkins, J., Pigram, J., 2013. Encyclopedia of Leisure and Outdoor Recreation. Routledge, London.

Jensen, F.S., 1999. Forest Recreation in Denmark from the 1970s to the 1990s. Forskningsserien nr. 26, Forskningscentret for Skov & Landskab, Hørsholm (in Danish).

Jensen, F.S., 2003. Friluftsliv i 592 skove og andre naturområder [Outdoor recreation in 592 forests and other nature areas]. Skovbrugsserien nr. 32, Forskningscentret for Skov & Landskab, København (in Danish).

Jensen, F.S., Koch, N.E., 2004. Twenty-five years of forest recreation research in Denmark and its influence on forest policy. Scand. J. Forest Res. 19 (4), 93–102.

Jensen, F.S., 2006. Crowding in Danish forests – a nonexistent problem? In: Siegrist, D., Clivaz, C., Hunziker, M., Iten, S. (Eds.), Exploring the Nature of Management. Proceedings of the Third International Conference on Monitoring and Management of Visitor Flows in Recreational and Protected Areas. University of Applied Sciences, Zurich, Switzerland, September 2006, pp. 13–17.

Jensen, F.S., 2012a. Friluftsliv i skovene 2008 (2). Antal skovbesøg pr. år [Number of forest visits per year]. Videnblade Planlægning og Friluftsliv, nr. 6.1-65. Skov & Landskab, Frederiksberg (in Danish).

Jensen, F.S., 2012b. Friluftsliv i skovene 2008 (8). Transportafstand [Transport distance]. Videnblade Planlægning og Friluftsliv, nr. 6.1-72. Skov & Landskab, Frederiksberg (in Danish).

Johnson, A., Dawson, C., 2004. An exploratory study of the complexities of coping behavior in Adirondack wilderness. Leis. Sci. 26, 281–293.

Kline, P., 1993. The Handbook of Psychological Testing. Routledge, London.

Kleiber, O., 2001. Valuation of recreational benefits and visitor conflicts in an urban forest. In: Fifth International Conference of the International Society for Ecological Economics (ISEE), Moscow, Russia.

Konijnendijk, C.C., 2008. The Forest and the City. Springer Verlag, Berlin.

Kuss, F., Graefe, A., Vaske, J., 1990. Visitor Impact Management: A Review of Research. National Parks and Conservation Association, Washington, DC.

Louviere, J.J., Hensher, D.A., Swait, J., 2000. Stated Choice Methods and Applications. Cambridge University Press, New York, NY.

Maas, J., Verheij, R.A., Groenewegen, P.P., De Vries, S., Spreeuwenberg, P., 2006. Green space, urbanity, and health: how strong is the relation? J. Epidemiol. Commun. Health 60 (7), 587–592.

Manning, R., Valliere, W., Wang, B., 1999. Crowding norms: alternative measurement approaches. Leis. Sci. 21 (2), 97–115.

Manning, R., 2011. Studies in Outdoor Recreation: Search and Research for Satisfaction, 3rd edition. Oregon State University Press, Corvallis, OR.

Manning, R.E., Ciali, C.P., 1980. Recreation density and user satisfaction: a further exploration of the satisfaction model. J. Leis. Res. 12, 329–345.

Miljøministeriet, 2012. Ny national friluftspolitik [New national outdoor recreation policy], Retrieved from: http://www.naturstyrelsen.dk/naturoplevelser/friluftspolitik/ (15.07.14).

Owens, P.L., 1985. Conflict as a social interaction process in environment and behaviour research: the example of leisure and recreational research. J. Environ. Psychol. 5, 243–259.

Olsen, B.S., Bonnichsen, O., Laugesen, M.f., Dubgaard, A., Thorsen, B.J., 2013. Adgang til grønne områder, fysisk aktivitetsniveau og sundhed. Er der evidens for en sammenhæng, der kan vurderes samfundsøkonomisk? [Access to green spaces, physical activity and health. Is there evidence for a correlation which can be socioeconomically evaluated?] IFRO rapport 217. Institut for Fødevare- og Ressourceøkonomi Københavns Universitet, Copenhagen (in Danish).

Parsons, G.R., 1991. A note on choice of location in residential travel cost demand models. Land Econ. 67 (3), 360–364.

Phaneuf, D.J., Smith, V.K., 2005. Recreation demand models. In: Mäler, K.G., Vincent, J.R. (Eds.), Handbook of Environmental Economics. Elsevier B.V., Amsterdam, pp. 671–761.
Rapoport, A., 1975. Toward a redefinition of density. Environ. Behav. 1, 133–158.
Scarpa, R., Thiene, M., Train, K., 2008. Utility in willingness to pay space: a tool to address confounding random scale effect in destination choice to the Alps. J. Agric. Econ. 90 (4), 994–1010.
Shelby, B., Vaske, J.J., Heberlein, T.A., 1989. Comparative analysis of crowding in multiple locations: results from fifteen years of research. Leis. Sci. 11, 269–291.
Stenar, M., 2012. Spids konfrontation - cyklister sætter liv og førlighed på spil [Sharp pointed confrontation - cyclists put life and limb on the line]. Skoven 44, 294–295 (in Danish).
Stewart, W.P., Cole, D.N., 2001. Number of encounters and experience quality in Grand Canyon Backcountry: consistently negative and weak relationships. J. Leis. Res. 33 (1), 106–120.
Stokols, D., 1972. On the distinction between density and crowding: some implications for future research. Psychol. Rev. 79, 275–277.
Sælen, H., Ericson, T., 2013. The recreational value of different winter conditions in Oslo forests: a choice experiment. J. Environ. Manage. 131, 426–434.
Søderlund, K., 2012. Flere søm i skovbunden [More nails in the forest floor]. Skoven 44, 478–479 (in Danish).
Thapa, B., Graefe, A.R., 2003. Level of skill and its relationship to recreation conflict and tolerance among adult skiers and snowboarder. World Leis. J. 45 (1), 13–25.
Train, K.E., 2003. Discrete Choice Methods with Simulation. Cambridge University Press, Cambridge.
Train, K., Weeks, M., 2005. Discrete choice model in preference space and willing to pay space. In: Scarpa, R., Alberini, A. (Eds.), Application of Simulation Methods in Environmental and Resource Economics. Springer Publisher, Dordrecht, pp. 1–16.
Tratalos, J., Sugden, R., Bateman, I., Gill, J., Jones, A., Showler, D., Sutherland, W., Watkinson, A., 2013. The conflict between conservation and recreation when visitors dislike crowding: a theoretical and empirical analysis of the spatial distribution of recreational beach users. Environ. Resour. Econ. 55 (3), 447–465.
Tyrväinen, L., (Academic dissertation) 1999. Monetary Valuation of Urban Forest Amenities in Finland. Research Papers 739. Finnish Forest Research Institute, Vantaa.
Tyrväinen, L., 2001. Use and valuation of urban forest amenities in Finland. J. Environ. Manage. 62, 75–92.
Vaske, J.J., Carothers, P., Donnelly, M.P., Baird, B., 2000. Recreation conflict among skiers and snowboarders. Leis. Sci. 22, 297–313.
Vaske, J.J., Donnelly, M.P., Lehto, X., 2002. Visitor crowding and normative tolerances at congested areas of Rocky Mountain National Park. In: Human Dimensions of Natural Resources Unit Report, 50. Colorado State University, Fort Collins, CO.
Vaske, J.J., Needham, M.D., Cline Jr., R.C., 2007. Clarifying interpersonal and social values conflict among recreationists. J. Leis. Res. 39, 182–195.
Vedel, S.E., Thorsen, B.J., Jacobsen, J.B., 2009. First-movers, non-movers, and social gains from subsidizing entry in markets for nature-based recreational goods. Ecol. Econ. 68, 2363–2371.
Vedel, S.E., 2010. Economic Incentives for Provision of Environmental Goods and Services from Forest and Natural Areas. University of Copenhagen, Copenhagen.
Von Haefen, R.H., Phaneuf, D.J., 2008. Identifying demand parameters in the presence of unobservables: a combined revealed and stated preference approach. J. Environ. Econ. Manage. 56 (1), 19–32.
Whitehead, J.C., Pattanayak, S.K., Van Houtven, G.L., Gelso, B.R., 2008. Combining revealed and stated preference data to estimate the nonmarket value of ecological services: an assessment of the state of the science. J. Econ. Surv. 22 (5), 872–908.
Zandersen, M., Termansen, M., Jensen, F.S., 2007. Evaluating approaches to predict recreation values of new forest sites. J. Forest Econ. 13, 103–128.