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Research Paper

Providing ecological, cultural and commercial services in an urban park: A travel cost–contingent behavior application in Finland

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HIGHLIGHTS

- Diverse services should be included in the valuation of the benefits of urban parks.
- The use of combined TC-CB provides many advantages in the valuation of urban parks.
- Improvements of an open access park benefit low-income citizens more.
- Informing and communicating about the services raises the use and value of a park.
- Stream restoration was found highly profitable at the societal level.

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ABSTRACT

The need for monetary valuation of recreational ecosystem services in urban areas is greatly acknowledged in several contexts. Most often, studies provide a total value of recreational visits, but a separate contribution of ecosystem, cultural, and commercial services to the value of recreation in urban ecosystems is rarely provided. In this study, the recreational importance of an urban park including streams is assessed, and the welfare implications of planned future improvements in three types of service are revealed, i.e. the restoration of the reproductive brown trout population, an increased number of happenings or events, and the service of a cafeteria-restaurant. Travel cost and contingent behavior methods are combined, which has not previously been applied in such a context. The results show that people perceive the park's importance for their well-being. The improvements of each service separately tended to increase the value between 14% and 21%, and of all services simultaneously by 66%. Remarkably, individuals with low incomes valued the park more than wealthier individuals. As the park is a free access environment, this suggests that the improvement of its recreational possibilities may especially benefit those with fewer opportunities for chargeable free time activities. Respondents' awareness of the reconstruction and management project of the park and the streams tended to increase the number of visits to and value of the park. At the societal level, the stream restoration was found to be highly profitable.

1. Introduction

Green parks, woodlands, natural fields, and the green spaces in the surroundings of water bodies represent a fundamental component of any urban ecosystem. As such, they provide diverse ecosystem services (ES) to local people and visitors, including improved air and water quality, noise reduction, biodiversity preservation, and opportunities for recreation (Haase et al., 2014). However, recreational benefits are often associated with human-made services available in urban green areas. These include facilities for recreation such as trails and benches, and commercial and cultural services such as cafés, restaurants, and events. This service mix poses a challenge for managers of urban green areas, because people may have various preferences for different services.

To make ES visible and comparable with more tangible marketable benefits for policy makers and city planning, for example, the need for their valuation in monetary terms has already been perceived as

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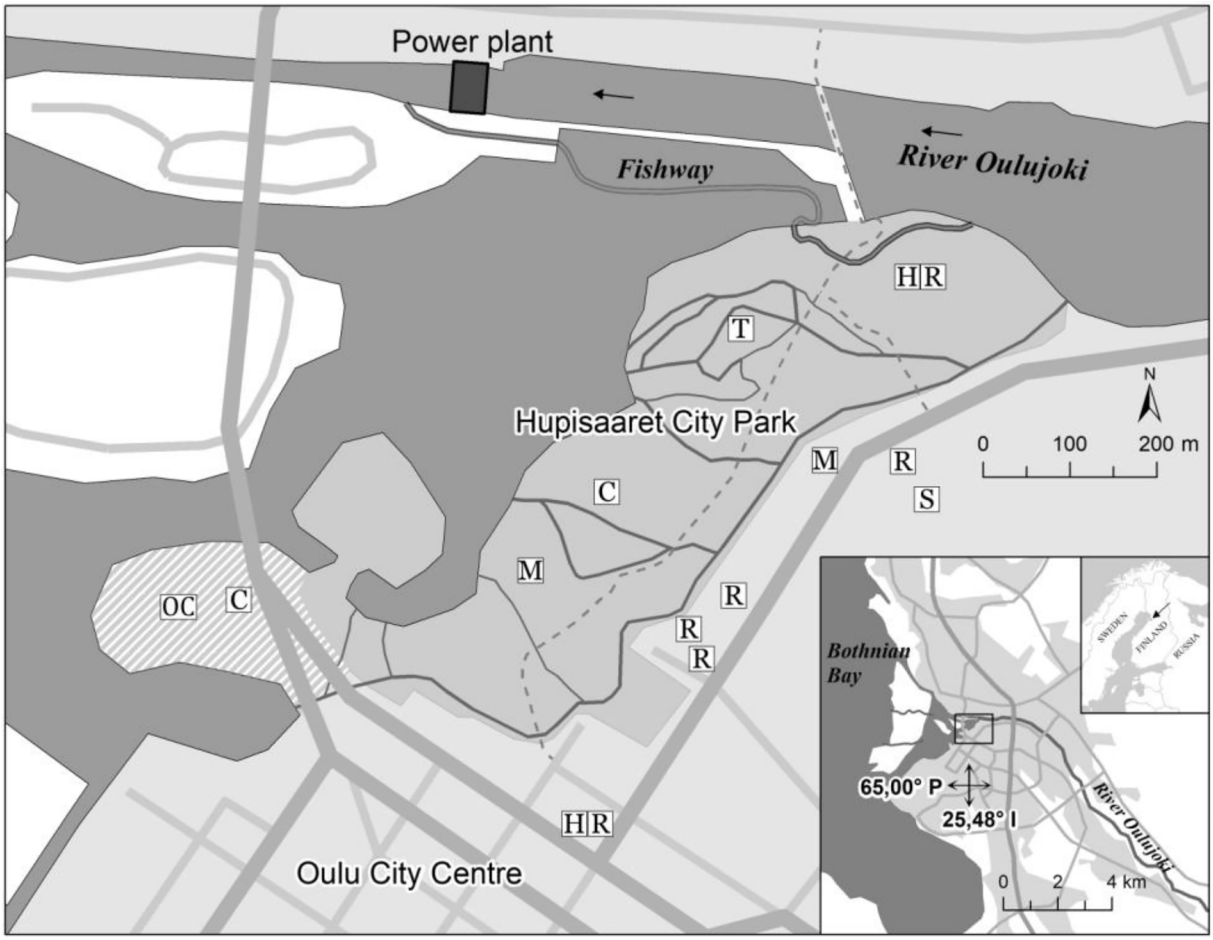

Fig. 1. The location of Hupisaaret City Park in the City of Oulu, Finland. Legend: C = café, H = hotel, M = museum, OC = remains of Oulu Castle, R = bar or restaurant, S = science center, T = summer theater, = stream, = bicycle path.

important for a long time (More et al., 1988). As urban green spaces are mostly open access environments, and their services resemble public goods that are not traded in genuine markets, the valuation of their benefits has been made in numerous previous studies by non-market valuation methods, i.e. hedonic pricing (HP (e.g. Melichar & Kaprová, 2013; Poudyal et al., 2009; Tyrväinen & Miettinen, 2000)), contingent valuation (CV (e.g. Calleja et al., 2017; Loomis et al., 2000; Sarvilinna et al., 2017)), travel cost (TC (e.g. Bertram & Larondelle, 2017; Hanauer & Reid, 2017; Iamtrakul et al., 2005)), or choice experiments (CE (e.g. Bertram et al., 2017; Collins et al., 2005; Vecchiato & Tempesta, 2013)).

Most of the studies listed above did not separate the values of different types of service, mostly due to the methodology chosen, but provided a total value as a result. However, in the valuation of urban green areas, concentrating only on one or two types of service is often too narrow. In addition to environmental amenities, visitors may also commonly enjoy cultural benefits and commercial services during a visit in a park. Cultural benefits, partly public goods with free entrance, partly private goods with extra entrance fees, may include participating in events. Commercial services, drinking refreshments and coffee in a café, or buying ice cream or candy at a kiosk are typically private goods, for example. One might therefore argue that the experience of a recreational visitor in an urban park is a composite good (Downward et al., 2009) consisting of ecological, cultural, and commercial benefits, i.e. public and private goods. Consequently, if the wider variety of benefits is not taken into account in an assessment, it is not known how different types of benefit together or in relation to each other affect the attractiveness and values of urban parks, as well as the welfare of visitors. It is therefore important to understand the relative values of different services provided by urban green areas in supporting their efficient planning, design, and management.

However, some studies have considered several characteristics of urban green areas or their provision of different services at the same time. One example is the HP study by Sander and Haight (2012), who reported partial values for views of green sites, access to outdoor recreation, and the benefits provided by urban tree cover. Also with HP, Morancho (2003) estimated the effect of views, as well as the distance and size of the nearest green areas, on housing prices. A CE study by Mieno et al. (2016) valued various social conditions of a recreational trail use, such as the congestion of visitors and their picking of berries and mushrooms in an urban forest. A CE study by Arnberger and Eder (2011) estimated the effect of the number of visitors, visitor composition, dog walker behavior, trail environment, trail type, recreational infrastructure, littering, and vandalism on the value of an urban greenspace. In a CE study assessing the residents' values of an urban stream, Bae (2011) used a concrete-encased stream or a natural-state stream as the natural attribute levels, and a recreational area with a walkway and facilities, a recreational area with a walkway, or no recreational area as the recreational attribute levels. The CE study by Collins et al. (2005) revealed the value of three attributes of a stream, i.e. aquatic life, swimming, and scenic quality. Finally, also applying CE, Taváreza and Elbakidze (2019) studied residents' values related to improved trails, an event stage, stands with binoculars, and a community garden in an urban forest. However, a limitation of these studies is that they mostly assess the values of different types of ES or a combination of ES and social or cultural benefits, neglecting the contribution of commercial services.

Yet one might ask if this criticism is appropriate if we wish to combine in the same study public good (environmental quality), partly public, partly private good (cultural services), and private goods (commercial services), and use a non-market valuation method to value them. If people buy coffee or ice cream at a restaurant, there is an actual market for these tangible private goods. For this alone, a hypothetical market is unnecessary. However, a policy maker cannot rely on an actual market, because there is no cafeteria-restaurant selling its products, or happenings or events producing experiences in the park. For a decision to support and/or subsidize these activities, she or he therefore needs factual information for which such a study is possible and useful. This study aimed to highlight this perspective.

In addition, the assessment of the benefits produced by the three types of goods can be justified and rationalized by the fact that the park's development may involve synergies or a tradeoff between the various services it offers. For example, a refreshing drink at the cafeteria in a pleasant natural environment may be more valuable than the separate benefits of a visit to the site and a drink in a less pleasant environment. The simultaneous valuation of goods in the same survey may produce information that cannot otherwise be found.

Furthermore, it is possible to use non-market valuation techniques to assess the values of the three types of goods. For example, in the development of CE for the valuation of environmental benefits, researchers have learned from experiments conducted in marketing research with conjoint analysis (CA). These studies assessed consumers' WTP for different characteristics of new private goods that might have been launched to an actual market (Bunch et al., 1993; Louviere, 1992). Correspondingly, if there is no cafeteria in the park at present, the services it will produce are a new benefit for visitors. This also partly concerns happenings or events, because part of them may be private goods with an entrance fee.

This study sheds light on the deficiency of neglecting the combined valuation of ES, cultural benefits and commercial services. It values the recreational services provided by urban green areas by assessing the benefits of ecological, cultural, and commercial services, both simultaneously and separately. The objective of the study is to examine the importance of the Hupisaaret City Park (Fig. 1) to the residents of the City of Oulu, Finland, and to analyze the monetary welfare implications of future improvements in the park's three types of services. First, the characteristics that describe the park in the respondents' minds are investigated, and the importance of local people's activities practiced in the park is assessed. Second, the importance of the ecological, cultural, and commercial services for the attractiveness of the park is modeled. Third, the recreational value of each service and all the services for an average resident, as well as the total recreational value of the reconstruction and management project for all the city's residents, are estimated. The study was conducted in cooperation with the City of Oulu's park manager.

The combination of revealed and stated preferences is not a new methodology in non-market valuation. Ben-Akiva and Morikawa (1990), for example, evaluated commuters' choices related to the transportation mode in Yokohama, Japan, and Christie et al. (2007) evaluated improvements to recreational facilities in forests in the UK. This study combined TC and contingent behavior (CB) as a method to assess the benefits of an urban park including streams. As far as is known, this method has not previously been applied to this type of context. Adamowicz et al. (1994) used CE and TC data sets to assess the recreational value of alternative flow scenarios in two fishing rivers in Alberta, Canada; Hanley et al. (2003) used a TC-CB method to value coastal water quality improvements in Scotland; and Lankia et al. (2019) employed a similar approach in analyzing the effects of changes in water quality on recreational benefits, especially on swimming trips in Finland.

The combined TC-CB method has several advantages in the valuation of non-market benefits. The TC part of the method is based on actualized numbers, i.e. trips respondents have really made. The CB part is hypothetical, revealing future behavior, namely, the variation of the number of trips due to the change of the quality of an amenity. This approach may provide more reliable results than a purely hypothetical assessment. The hypothetical nature of the stated preference methods has often been claimed to be a source of hypothetical bias (Murphy et al., 2005) and strategic behavior (Johnston et al., 2017; Milon, 1989). Hence, the realized trips as a basis for the assessments may decrease biases that purely hypothetical stated preference studies may cause (Harrison & Rutström, 2008). Moreover, as a stated preference method, CB has advantages in being able to value conditions beyond what is actually available. This is common with other stated preference methods such as CV and CE. The final advantage of the application of CB is that it may use attributes in a survey similarly to CE. This characteristic enables CB studies to separate the different components of a total value and assess the relative priority of different services in the urban park. The results of the study help policymakers compare costs and benefits and assess the social profitability of the reconstruction and management projects of urban parks. In addition, the developed approach is widely applicable to various land use planning situations where the provision of various services must be considered at the same time.

Table 1
Gender and age of the respondents of the Hupisaaret study and the City of Oulu.

		Hupisaaret study	Population of the City of Oulu[a]
Gender (%)	Female	50.5	50.3
	Male	49.5	49.7
	All	100.0	100.0
Age (years, %)	16–24	13.6	17.9
	25–34	15.9	18.5
	35–44	15.1	16.7
	45–54	16.9	13.7
	55–64	17.1	13.4
	Over 65	21.4	19.8
	Total	100.0	100.0

[a] Statistics Finland (2020).

2. Theoretical framework

To examine the effects of the proposed management actions on the recreation benefits of Hupisaaret City Park, a combined travel cost-contingent behavior approach was applied (TC-CB (e.g. Hanley et al., 2003; Whitehead et al., 2008)). Similarly, as in the traditional TC (a detailed description of the method can be found, for example, in Freeman, 2003, and Parsons, 2003), in the TC-CB data on the number of recreation visits made to a recreation area, the costs of travelling to a recreation site and other variables affecting visit frequency were used to estimate demand for and the value of visits to a recreation site. While in TC respondents were only asked how often they had visited the study area in the past year, in TC-CB, respondents were also asked to state how many visits they planned to make in the future (Hanley et al., 2003; Lankia et al., 2019). Inquiring about the number of future visits under multiple environmental quality or recreation area characteristic scenarios (here, under different park management scenarios) allows one to estimate how the quality attributes affect the number of visits and their value. TC-CB produces a demand curve for visits to the studied recreation area as a function of travel costs, individuals' socioeconomic characteristics, and environmental quality. Integrating the area between the demand curve and the current level of travel costs yields the value of a recreation visit as a visit's consumer surplus (CS).

In the estimation of the demand curve for recreation visits, special features of the TC-CB data need to be addressed. First, the number of recreation visits can only have integer values greater than or equal to zero. Second, pooling data on real past behavior and hypothetical future behavior together generates panel data with multiple observations for each respondent, which may cause a correlation in error terms between observations. To take these features into account in the modeling, the

Table 2
The possible alternatives of the realization of the objectives of a reconstruction and management project in Hupisaaret City Park.

Objective	Present state	Result if the objective is realized	Result if the objective is not realized
Restoration of the reproductive brown trout population	No reproductive brown trout population	A reproductive brown trout population will be restored.	No reproductive brown trout population will be restored.
Development of happenings or events	Happenings or events are organized occasionally	In the park, happenings or events related to sports, nature, and culture will be organized several times a week in the summer and at least twice times a month in the winter.	No development of the number of happenings or events. In the park, sports, nature, or cultural happenings or events will be organized as at present.
Development of the services of a cafeteria-restaurant	Cafeteria-restaurant is open in the summer	In the park, at least one cafeteria-restaurant will be open all year round.	Current services will not be developed. A cafeteria-restaurant will be open only in the summer.

demand curve is estimated with a random effects negative binomial model (Cameron & Trivedi, 1998). This is a commonly used econometric model in TC-CB studies that has been applied, for example, in Barry et al. (2011), Bertram et al. (2020), and Hanley et al. (2003).

In the model, the expected demand curve for recreation is specified as an exponential function

$$y_{iq} = e^{(\beta_0+\beta_{TCost}TCost_i+\beta_2 x_{2i}+\cdots+\beta_k x_{ki}+\beta_{trout}Trout+\beta_{event}Event+\beta_{cafe}Cafe)} \quad (1)$$

where y_{iq} denotes the number of trips an individual i (i = 1, 2,…, n) makes under eight different park management scenarios (Table 2), combined with the following attribute levels: q = 0 means the park's current status; q = 1 the restoration of the reproductive population of brown trout; q = 2 the development of happenings or events; and q = 3 the development of the services of a cafeteria-restaurant. The variable TCost is the travel cost faced by the individual. The management scenarios are included in the model as the dummy variables Trout, Event, and Café. For example, Trout = 1 denotes the restored reproductive population of brown trout, and Trout = 0 denotes the present state of the trout population, i.e. that there is no reproductive population of the species. Respectively, Event = 1 and Café = 1 mean improved event and cafeteria services, and Event = 0 and Café = 0 their current state. The variables x_{2i}-x_{ki} are the socio-demographic variables included in the model. The βs represent the coefficients to be estimated.

Socio-demographic variables commonly included in TC and TC-CB to capture respondents' heterogeneous preferences include income (Hynes & Greene, 2013), age (e.g., Laundry et al., 2012; Norman et al., 2010; Zhang et al., 2015), education and type of activities undertaken (e.g. Cho et al., 2014; Ezebilo et al., 2015; Ovaskainen et al., 2012; Shrestha et al., 2007), gender (e.g. Ready et al., 2018; Zhang et al., 2015), and employment status (Ready et al., 2018). The sign and whether they have a statistically significant impact on the recreation visit frequency have varied across studies. To be consistent with the economic theory, the travel costs of substituting recreation sites should also be included in the model (Rosenthal 1987).

The CS per visit can be calculated with the following formula (Englin & Shonkwiler, 1995; Haab & McConnell, 2002):

$$CS/y = -1/\beta_{TCost} \quad (2)$$

3. Case study area, materials and methods

3.1. Case study: Hupisaaret City park in the City of Oulu

Hupisaaret City Park is located in the City of Oulu, Northern Finland (65°01′N, 25°28′E; Fig. 1). Northern Fennoscandia's biggest city had a population of 203,600 at the beginning of 2019. Specifically, Hupisaaret City Park is part of the delta area where the River Oulujoki flows into the Gulf of Bothnia, a bay of the Baltic Sea. The River Oulujoki is a heavily regulated water body, with a mean discharge of ca. 250 m^{s-1}. Natural self-sustaining migratory fish populations ceased in the 1950s, when the lowermost hydropower plant was finished. At the beginning of the 2000s, the construction of a fishway was completed to enable some of the migratory fish to bypass the plant and dam. The park itself consists of several small islets, with a stream network running through it that is nearly 2 km in length (City of Oulu, 2020a).

The current Hupisaaret City Park area has been a place of gardens, craftsmen, the military, and small industry since the seventeenth century. It is of great cultural-historical significance, having been classified as a regionally important landscape in Finland (Pöyry, 2001). The park's walkways, and natural and cultural environment, create a diverse green space and recreational area for the city's residents and visitors. The streams and planted broad-leaved tree species rare in the northern latitudes, are special for the area (Niskala, 2005).

Between 2017 and 2018, the restoration of the stream network was carried out by the Department of Community and Environmental Services of Oulu City and the Centre for Economic Development, Transport and the Environment of North Ostrobothnia. The aim was to improve the habitat of endangered migratory fish species, mainly brown trout (*Salmo trutta* L.), which is native to Europe. The main action implemented was the removal of excessive sand and fine sediment from the streams to limit the overgrowth of aquatic macrophytes and make the old dams less steep to allow fish migration. Importantly, the local hydropower company and the City of Oulu rechanneled the streams so that the constant water flow (ca. 0.4 m^{3s-1} in the winter and 1.0 m^{3s-1} in the summer) was guided to the stream network all year round to replace the previously dry winter period. The addition of spawning gravel, logs, and boulders and transplanting of aquatic moss continues as voluntary work carried out by local citizens.

After the restoration work and new water arrangements for the stream network, the enhancement project for brown trout in Hupisaaret City Park was launched. From a local hatchery, the Natural Resources Institute Finland (Luke) transported 26 mature and individually tagged brown trout, both females and males, to the streams in early October 2018. Due to the restoration work, fish were also able to migrate from the Baltic Sea to the stream network. The fish were observed to spawn at various sites in the stream network, and following spawning, the densities of one-summer-year-old trout were high the following summer. In addition, the economically important one-summer-year-old Atlantic salmon (*Salmo salar* L.) and migratory whitefish (*Coregonus lavaretus* L.) were also caught in monitoring, reflecting the short-term success of the restoration project (P. Louhi, pers. obs.).

Commercial services and cultural happenings or events may increase people's recreational enjoyment in an urban park. There is currently a cafeteria-restaurant, which only operates in the summer, and activities are organized randomly in Hupisaaret City Park. In future, the arrangement of happenings or events will be easier, because the construction of a summer theater has recently been completed. In addition to drama, the summer theatre is a suitable stage for music, dance, skateboarding, and different activities for families and children. The park also offers a good location for sports and physical exercise for both children and adults. Located near a couple of schools and a science center, the area is also an excellent place for environmental education.

3.2. Questionnaire, data collection and sample representativeness

The study's data set is based on a survey directed at people aged over 15 living within the borders of the City of Oulu, Northern Finland. We introduced and sent the early versions of a questionnaire twice to the members of the research project's steering group and some other stakeholders, including the representatives of Oulu's park manager, asking for suggestions and comments. After a pre-test of the questionnaire with a pilot survey of 15 respondents in March 2019, we made final clarifications to the questionnaire. The main survey was conducted online in April 2019. Practical data collection was organized by a commercial survey company, Makery Ltd, from a representative panel of 300 people selected from the population by the company. The company selected the panel from a larger group of people that had voluntarily registered in a group of willing respondents. The selection was performed to ensure the panel represented the population of Oulu with respect to gender and age. The company sent a link to each of the panel's respondents with an invitation to participate in the survey. After one week, the company supplemented non-responses with new recruitments from the group until the limit of 300 responses was reached.

To assess the sample's representativeness, the data was compared to the statistics of the population of the City of Oulu produced by Statistics Finland (2020 [Table 1]). In both datasets, the gender share was about the same, but in terms of age, there was a slightly greater emphasis on older respondents. In general, the sample represents the population quite well.

The survey questionnaire comprised five sections. The first asked about opinions, attitudes, and meanings respondents associated with Hupisaaret City Park. The second contained questions related to respondents' visits to the park during the last 12 months, including the number of visits, the distance to and time spent in the park, the main activities, the relative importance of the visit, and the transportation means for a typical visit. The third briefly described the proposed reconstruction and management project with three objectives, i.e., restoring the permanent brown trout population in the streams, increasing the number of happenings or events in both summer and winter, and extending the services of a cafeteria-restaurant all year round. The subsequent questions inquired generally about respondents' awareness of the project, and how important and desirable they thought it was.

The fourth section, i.e. the actual CB section, contained all the different scenarios for the reconstruction and management project, where objectives were either realized or not (Table 2). Concerning ecological quality, respondents were told that despite the completed reconstruction work in the streams, the result of the ecological objective, i.e. "A reproductive brown trout population will be restored," remained uncertain. The respondents were then asked to assess how often they would visit the park in the following 12 months, divided into the summer (May to September) and winter (October to April) if each of the management alternatives was realized.[1] In the analysis, the two figures were added up to produce a single number of visits per person per year. There was a total of eight alternative project combinations in the survey, but each respondent had to answer only four versions in random order. The survey company randomly selected each scenario for the respondents to ensure that each objective was actualized for each respondent at least ones. In the analysis, we used the number of visits the respondents reported in the past 12 months in the survey as the status quo observations. The questionnaire's final section asked for the usual socio-economic background details, including the participant's income level.

[1] See an example of the alternative reconstruction and management project in Appendix A.

Table 3
Descriptive statistics for the dependent variable VISITS used in the analysis or the total number of visits made in the past 12 months and potentially made in the different scenarios in the upcoming 12 months.

VISITS	Trout	Happenings/ events	Cafeteria-restaurant	Mean	Std. Dev.	n
Realized number of visits during past 12 months (status quo)	0[a]	0	0	9.87	18.60	300
Scenario 1	0	1[b]	1	10.11	16.13	150
Scenario 2	1	0	1	11.49	18.11	150
Scenario 3	1	1	0	9.79	16.42	150
Scenario 4	0	0	1	9.39	18.23	150
Scenario 5	1	0	0	9.84	17.21	150
Scenario 6	0	1	0	9.07	16.60	150
Scenario 7	1	1	1	11.16	16.84	150

[a] 0 = Objective will not be realized.
[b] 1 = Objective will be realized.

Table 4
Description and descriptive statistics of the independent variables used in the analysis.

Variable	Description	Mean	Std dev.
TROUT	A reproductive population for brown trout will be restored; binary variable, 1 = yes, 0 = no.	0.50	0.50
EVENT	Happenings or events related to sports, nature and culture will be organized several times a week in the summer and at least two times a month in the winter; binary variable, 1 = yes, 0 = no.	0.50	0.50
CAFÉ	At least one cafeteria-restaurant will be open all year round; binary variable, 1 = yes, 0 = no.	0.50	0.50
TRAVCOST	Travel costs from home to the park calculated using the average cost of a private car, €0.30/km, and the distance from home to the park; continuous variable.	2.72	3.81
	Distance from home to the park, km; continuous variable; self-reported by the respondents and measured as street distance.	8.99	12.81
INFORMED	Very aware of a reconstruction and management project; binary variable, 1 = yes, 0 = no.	0.10	0.30
ALONE	Usually visits the park alone; binary variable, 1 = yes, 0 = no.	0.19	0.39
BIKEWALK	Walks or cycles to the park; binary variable, 1 = yes, 0 = no.	0.49	0.50
IMPORT	Related to a whole trip, the importance of an average visit to the park; binary variable, 1 = the only destination or more important than other destinations, but not the only one or as important as other destinations, 0 = others.	0.70	0.46
PRIMARY	Primary school is the highest level of education; binary variable, 1 = yes, 0 = no.	0.06	0.24
VOKAT	Vocational school is the highest level of education; binary variable, 1 = yes, 0 = no.	0.30	0.45
LOWINC	Personal net income €1000 - €1999/month; binary variable, 1 = yes, 0 = no.	0.32	0.47
CB-DUMMY	Variable indicating whether an actual or hypothetical situation is considered; binary variable, 1 = hypothetical future visits, 0 = actual visits.	0.91	0.28

3.3. Variables used in the analysis

In the quantitative assessment of the park's recreational value, the number of realized and possible future trips to Hupisaaret City Park was analyzed. As each respondent had to assess the number of trips for four different management alternatives, there was panel data with four observations per respondent. The data was constructed by combining the

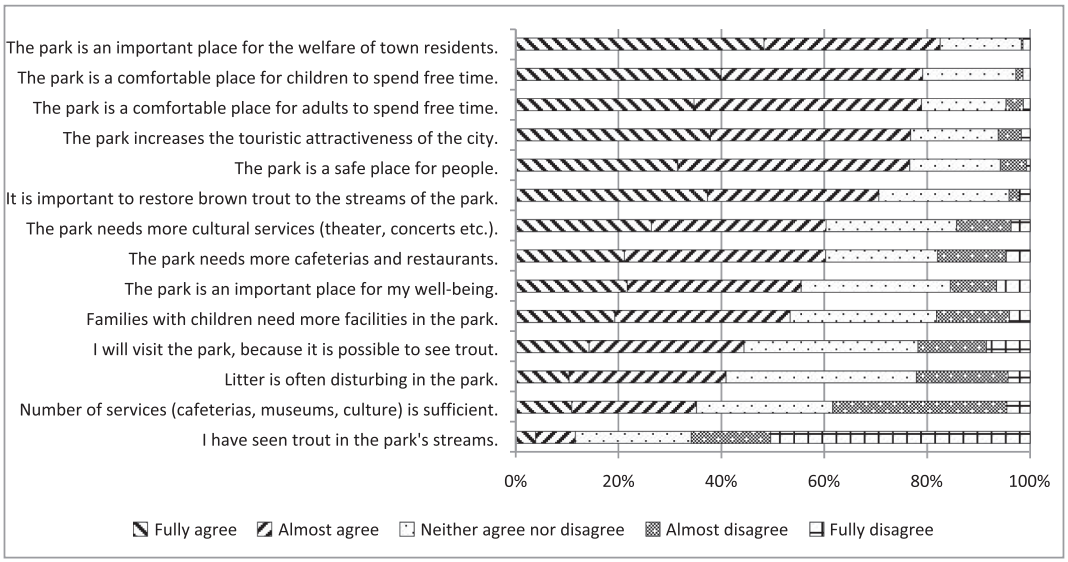

Fig. 2. The opinions and attitudes of city residents concerning Hupisaaret City Park; n = 300.

realized number of trips in the previous 12 months given by the respondents and the number of potential future trips if each of the management alternatives was realized. Accordingly, the dependent variable, i.e. the total number of visits realized in the past 12 months and potentially in the upcoming 12 months, VISITS (Table 3), received only integer numbers larger or equal to zero.

The independent variables for the model used in the analysis (Table 4) included three variables, TROUT, EVENT and CAFÉ to describe whether the reproductive population of brown trout would be restored, more happenings or events would be organized, and whether one cafeteria-restaurant would be open all year round in the park. As the realization of these services should increase the park's attractiveness and recreational value, it was expected that the coefficients of the variables would be positive. The independent variables also included several individual-specific variables to capture the heterogeneous preferences of respondents, which will be described next.

In relation to the valuation, the TRAVCOST variable (i.e. travel cost from home to the park) is the most important regressor in the model. The figure was calculated by multiplying the average cost of a one-kilometer drive in an average private car, €0.30 (Bertram & Larondelle, 2017; Traficom, 2020), with each respondent's distance from the park in kilometers, which in this study was an average of 8.96 km. As the distance to the park was a cost to the visitor, a negative coefficient was expected, meaning that those who lived nearer would more often increase the number of visits than others.

The aim of the question behind the variable INFORMED was to reveal how aware respondents were of the reconstruction and management project for the park and the streams. It was assumed here that if respondents were very aware of the project, they would be more interested in the city's nature-related and recreational issues, and tend to visit the park more often than other respondents.

The next two variables represented information related to how visitors traveled to the park. It was assumed that the coefficient ALONE should have a plus sign indicating that it was easier to make a visit alone than with someone else. In addition, BIKEWALK divided the means of transportation between visitors.

As some people might only walk or cycle through the park without staying there even for a while, for example, the next binary variable IMPORT described the relative importance of an average visit to the park in an entire trip (Armbrecht, 2014; Loomis, 2006a). The variable received the value 1 if the visit were the only purpose, more important than other purposes, not the only one, or as important as other purposes, and 0 if other.

The next three variables are related to the socio-demographic characteristics of respondents. The binary variable PRIMARY took the value 1 if the respondent's highest level of education was primary school, and 0 if other. VOKAT produced the same response if the highest level of education was vocational school, that is, a school providing training in specific skills required for different industries (Calleja et al., 2017). Finally, LOWINC was a binary variable that characterized respondents with a low income, i.e. if their personal net income was between €1000 and €1999 per month. According to the standard economic theory, the larger the income of a consumer, the larger WTP is for a normal commodity. In the case of an urban park, this should mean that people earning more would visit the park more often if the quality of the park increased. However, recreation in a park may not be a normal good but an inferior good if richer individuals prefer costly leisure alternatives or their own private gardens, for example. There was therefore no clear expectation of the effect of people's income on the number of visits (Hökby & Söderqvist, 2003; Khan, 2009).

Finally, the binary variable CB-DUMMY indicated whether a person responded to an actual or hypothetical situation, showing whether the mere switch from the SQ to either CB scenario significantly changed the number of visits. This variable was therefore included to capture the potential hypothetical bias associated with CB scenarios.

4. Results

4.1. Descriptive results: The importance of different aspects of the urban park

Concerning the research problem that Hupisaaret City Park represented to the public, the kind of meanings with which the park was loaded, and the identity of the park, 14 statements about the area were tested. Based on the results, the park was seen as an important place for well-being, and spending time with children and friends (Fig. 2). In addition, most citizens considered the park a safe place that brought tourists to the City of Oulu. Most respondents also saw the restoration of streams for trout as important, although a clear minority had experienced them in the Hupisaaret streams.

It could be observed from the results that the residents of Oulu requested better services, both commercial and cultural, including cafeterias, restaurants, events, and art. It was evident that there was a need for more and new kinds of service, but there were limits to what was acceptable. Of the respondents, 73.9 percent saw it as very or fairly desirable that "Hupisaaret City Park is kept as natural as possible, and

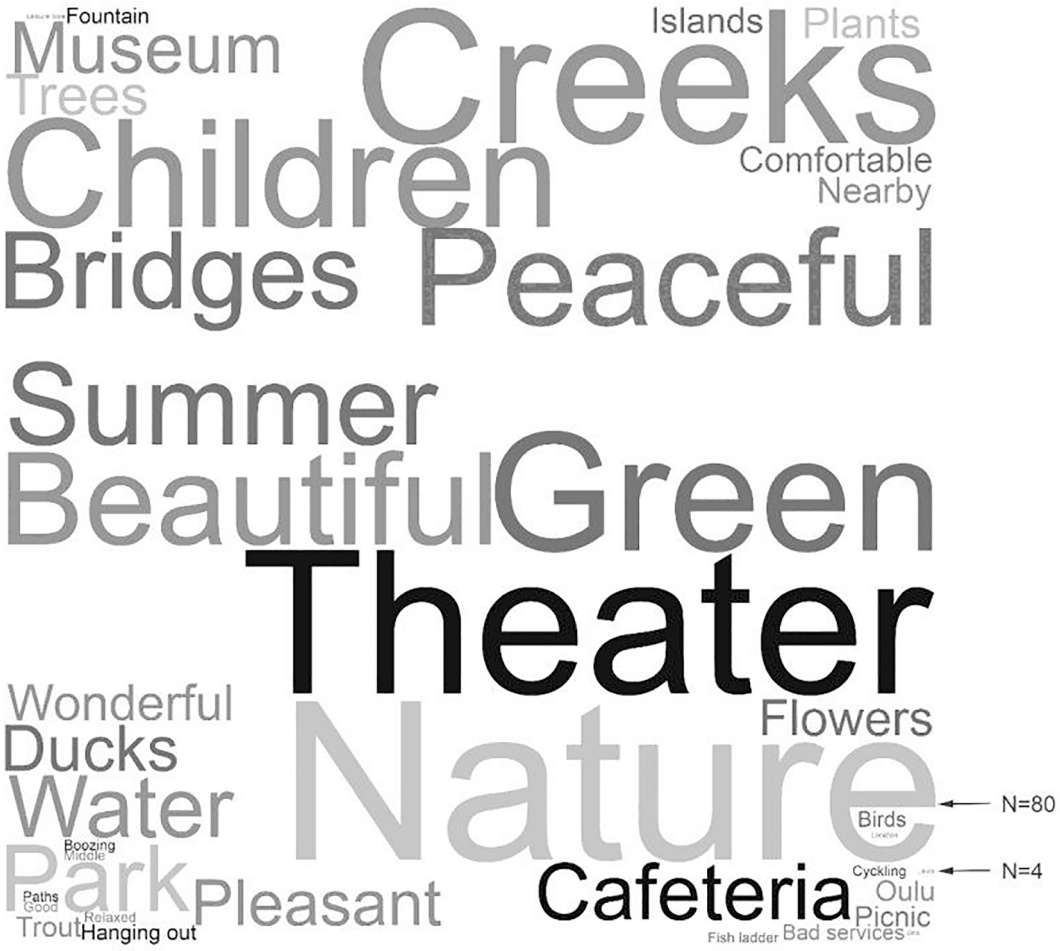

Fig. 3. Word cloud for the 40 most popular words linked to Hupisaaret City Park. The size of the font indicates how often the word came to the respondent's mind. The cloud gives a visual representation of the meaning of the area.

little or no new construction is permitted." Maintaining the current near-natural state was considered important, but there was also an acceptance of light construction. Public buildings or structures for cafeterias, restaurants, or cultural events were a very or fairly desirable option for 70.0% of respondents. A certain dilemma could be seen between attitudes to maintaining a natural state and accepting construction for public services.

Hupisaaret City Park was indeed considered a place of nature. Respondents were asked to give the first three words that came to mind to describe the area. After unifying the forms of the given words, the data finally consisted of 143 words or concepts, which were mentioned a total of 803 times. Fifty-one percent (n = 409) of mentions were related to nature. To illustrate the data and meanings that the park received through this exercise, a word cloud was designed from the 40 most popular words (Fig. 3). The image stressed the area's meanings as a place of nature, culture, and children and as a joyful space.

The park's meanings and identity were also sought by providing 24 attributes and asking whether they were connected to the Hupisaaret area. The most frequently checked options were "Nature", "Water" and "Trees" (Fig. 4). Four out of 24 offered words were related to nature, but in the responses, the top three were nature-related. The result underlines that Hupisaaret City Park is recognized as a natural, green, and blue area, a place for spending outdoor time with friends and families.

Finally, using their own words, respondents were asked to provide any ideas for development of the area. In total, 91 ideas were given, which were classified according to five themes and distribution: more activities and cultural services (33.0%), maintaining natural state and beauty (30.8%), more services such as cafeteria and toilets (16.5%), safety issues (11.0%), and other matters (8.8%). Consequently, by analyzing the free comments provided by respondents and other data, the result that Hupisaaret City Park represented a place that provided ecological, cultural, and commercial services for Oulu residents was reinforced.

4.2. Estimation of a TC-CB model

As expected, the coefficients of all three types of services (TROUT, EVENT, and CAFÉ) had a positive and statistically very significant sign, meaning that the restoration of the reproductive brown trout population in the streams, the increased number of happenings or events, and a cafeteria-restaurant with an all year round service tended to increase visits to the park (Table 4, see also a TC-BC model including travel costs and hypothetical attributes, and excluding socioeconomic controls in Appendix B). In addition, the TRAVCOST coefficient was negative and statistically significant, indicating that the increasing travel costs to the park reduced the number of visits. According to the coefficient, an increase of €10 in travel costs to the park reduced the average number of visits per person by 0.47 times. As the assumption of a positive travel cost of €0.30 per km for each visitor, even if he/she traveled by bike or on foot, may affect results, we also tested the case with a zero cost for these visitors. The coefficient of this new variable was still negative, but it lost its significance. Moreover, the positive and very significant coefficient of INFORMED showed that a high awareness of the park's and streams' reconstruction and management project tended to increase with the number of visits to the park. Thus, if an individual was very much aware of them, he/she would make on average of 0.43 visits more

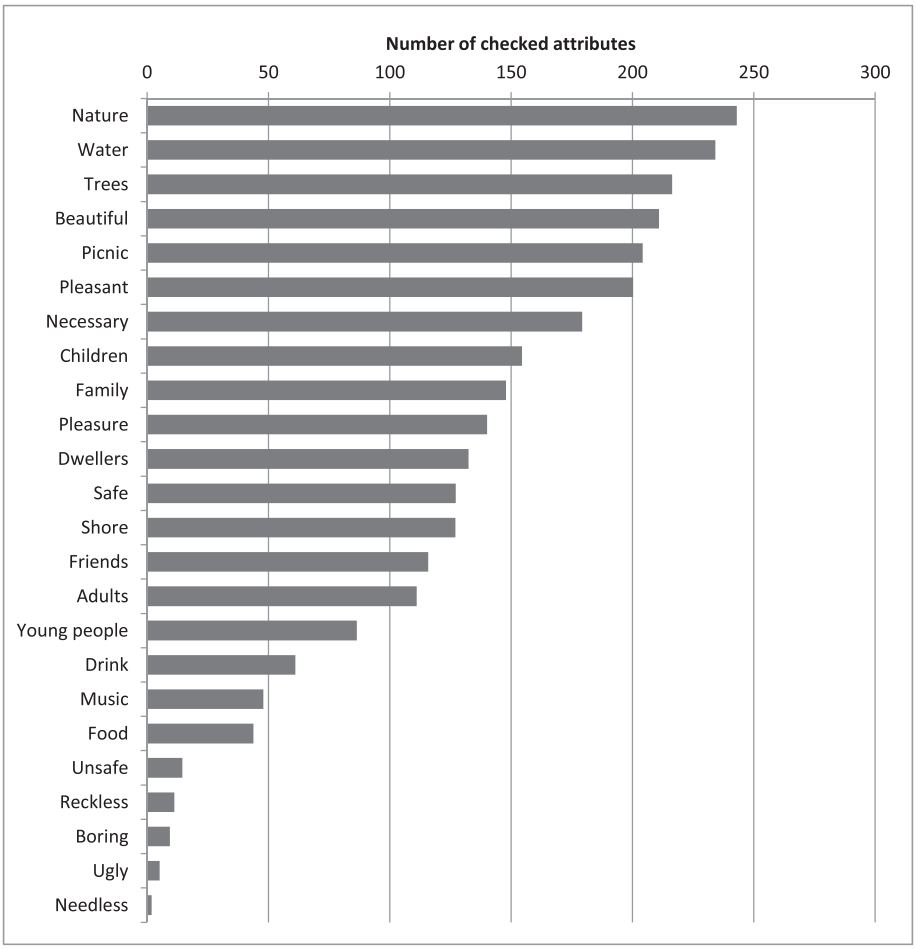

Fig. 4. Attributes describing Hupisaaret City Park. n = 300.

than others.

As the variable ALONE had a positive and significant coefficient, this indicated that if a respondent usually visited the park alone, he/she visited the park more often than others. In addition, BIKEWALK – with a positive and very significant coefficient – suggested that compared to other mean of transportation, walking or cycling tended to increase the number of visits. The same concerned the variable IMPORT: if a visit to the park was usually the only meaning or more important than other meanings, but not the only one or as important as other meanings, a respondent might visit the park more often than other respondents.

In relation to socio-demographic characteristics, if the respondents' highest level of education was primary school (PRIMARY), they would visit the park very significantly less often than others. VOKAT produced the opposite response: if the highest level of education was vocational school, this might increase the number of future visits. Finally, the very significant coefficient of LOWINC suggested that if a respondent's personal monthly net income was between €1000 and €1999, they would visit the park more often than other respondents. We found that the coefficient of CB-DUMMY was very significant and negative, indicating that a mere switch from the SQ to either CB scenario would decrease the assessed number of visits to the park.

We tested the model's possible multicollinearity by calculating the correlations between the variables that probably had a high correlation, i.e., BIKEWALK (walks or cycles to the park) and TRAVCOST (travel costs from home to the park), as well as between income and education. As Kendall's tau was 0.075 and Spearman's rho 0.088, we found no major correlation between BIKEWALK and TRAVCOST. In addition, as Kendall's tau and Spearman's rho between PRIMARY (highest education, primary school) and LOWINC (personal income after taxes €1,000 –

Table 5
Parameter estimates of citizens' TC-BC model for visits to Hupisaaret City Park in the City of Oulu.

	Coefficient	Standard Error
Constant	1.29337***	0.15000
TROUT	0.18937***	0.02935
EVENT	0.13366***	0.03412
CAFÉ	0.18157***	0.03593
TRAVCOST	−0.04658**	0.02108
INFORMED	0.42689***	0.13253
ALONE	0.25569**	0.12354
BIKEWALK	0.77400***	0.13703
IMPORT	1.07394***	0.14278
PRIMARY	−0.96627***	0.19182
VOKAT	0.40583***	0.10767
LOWINC	0.37508***	0.10887
CB-DUMMY	−0.24883***	0.04922
a[a)]	4.95072***	0.50079
b[a)]	2.00885***	0.19303
Fit statistics	Log likelihood function	−3126.17840
	AIC	6282.4
	AIC/N	5.235
	n (observations)	1200
	Panel (individuals)	300

***Significant at the 0.01 level.
**Significant at the 0.05 level.
*Significant at the 0.10 level.
[a)] a and b are estimated parameters of the beta distribution that describe the random effects specification of the negative binomial model (Bertram et al., 2020).

Table 6
The effects of the realized objectives on the number and recreational value of visits to Hupisaaret City Park for 203,600 Oulu citizens in 2019.

Objectives realized	Number of visits (abs.)	Increase in the number of visits (%)	Recreational value of visits (€)
None	10.46	0.0	45,715,572
Brown trout population	12.64	20.9	55,246,721
Number of happenings or events	11.95	14.3	52,253,088
Services of a cafeteria-restaurant	12.54	19.9	54,817,473
Total	17.32	65.6	75,719,747

€1,999/month) was 0.037 and between VOKAT (highest education, vocational school) and LOWINC 0.247, it seemed the model lacked major multicollinearity.

An attempt was made to include information about the price and availability of substitute recreation sites with some versions of variables describing visits to alternative natural environments, but this found no significant effect. In addition, a test was conducted on whether several other socio-demographic characteristics such as age, gender, employment status, or type of activities undertaken in the park would explain the number of visits in the TC-CB model. However, this found no significant relationship.

4.3. Monetary valuation of ecological, cultural and commercial services

Using the estimation results shown in Table 5, it was possible to assess the monetary recreational values of the realization of the objectives related to the ecological, cultural and commercial services of Hupisaaret City Park, i.e. the creation of the reproductive brown trout population in the streams, the increased number of happenings or events, and the extension of a cafeteria-restaurant's services to 12 months per year (Table 6). For this purpose, a calculation was first made concerning the number of visits that might be actualized if none of the objectives was realized. This could be done using Equation [1], setting the values of the dummies TROUT, EVENT, and CAFÉ to zero (i.e. by canceling the effects of all the objectives), and multiplying the coefficients of the other independent variables by the mean value of each variable. As a result, it was found that with no improvements, the number of visits would be 10.46 (Table 3). This is a noteworthy result, because the model predicts almost the same figure for the number of visits as the survey, i.e. 9.87 times.

If the former calculation was then modified by considering the effect of the coefficients of TROUT, EVENT, or CAFÉ by adding one coefficient after the other, we obtained the separate effect of each objective's realization. As results, the realization of the objective related to the brown trout population, the number of happenings or events, and the services of a cafeteria-restaurant would increase the average annual number of visits to 12.64, 11.95, and 12.54 respectively. If the objective related to the brown trout population or to the cafeteria-restaurant was realized, they alone would attract the largest and almost the same number of visitors to the park. The realization of the objective related to the number of happenings or events would attract a slightly smaller number. As the total effect, i.e. if all three objectives were actualized simultaneously, the average annual number would increase to 17.32 visits. If a comparison was made between the number of future visits without realizing any objective and the cases where each objective was realized one by one, it was found that the relative increase in visits would be 20.9%, 14.3%, and 19.9% respectively. If all the objectives were actualized at the same time, it would result in a 65.6% increase in the total number of visits.

Using the average number of visits per respondent revealed by the model, i.e. 10.46, and the estimated coefficient of TRAVCOST in the model, it was possible to assess the average recreational value of a visit in terms of consumer surplus (Eq. [2]), which was €21.50. Given the average number of visits, the recreational value of an average visit, and the number of Oulu citizens in January 2019 (203,600 people), the aggregate recreational value of the visits was €45,715,572 when none of the objectives was realized (Table 6). The corresponding annual aggregate values of future visits would be €55,246,721, €52,253,088, and €54,817,473 if the objectives related to the brown trout population, the number of happenings or events, or the cafeteria-restaurant were realized respectively. In addition, if all the objectives were realized at the same time, the aggregate recreational value of the park would be €75,719,747 per year. Furthermore, the additional annual value of the brown trout population, the number of happenings or events, or the cafeteria-restaurant, i.e. the difference between those cases realizing each objective and those without, would be €9,531,149, €6,537,516, or €9,101,901 respectively. Finally, the additional aggregate value of the park's and the streams' reconstruction and management project, i.e. the difference between realizing all the objectives and realizing none of them, was €30,004,175.[2]

5. Discussion and conclusion

The importance of the urban park to the residents of the City of Oulu in Finland was examined. The results show that Hupisaaret City Park is seen as an important place for well-being, and spending time with children and friends. When people were asked to describe the area, about half mentioned words connected with nature. Using a TC-CB dataset, an estimation was made of the welfare effects of the objectives related to the park's environmental, cultural, and commercial services. The model behaved logically so that that the restoration of the reproductive brown trout population in the streams, the increased number of happenings or events, and a cafeteria-restaurant with service all year round tended to increase the number of visits to the park. Specifically, the net value of the restoration of the brown trout population was found to be more than €9.5 million, which is a conservative estimate because it does not include non-use values. A noteworthy result is that as the costs of the restoration of the streams was about €380,000 (including the planning and construction costs of the City of Oulu and the Centre for Economic Development, Transport and the Environment of North Ostrobothnia; see City of Oulu (2020b); pers. comm.), the reconstruction was found to be highly profitable at the society level.

For policy making, an interesting and important result concerns the income of citizens. It was found that if a person had a low income, he/she would visit the park more often than wealthier individuals. The explanation may be that wealthier people have more opportunities to spend money on their free time activities than those who are less wealthy. For example, instead of a visit to a local park, wealthier people can afford to buy a movie ticket or travel to a national park located far from home. As the park is a free access environment, this suggests the improvement of its recreational possibilities may especially benefit those with fewer opportunities for chargeable free time activities. The project may therefore be a good investment from a social and equality perspective. This conclusion seems to be in line with the findings of Hökby and Söderqvist (2003), and Khan (2009).

Another interesting result is that if a respondent was very aware of the project, she or he tended to visit the park more often than others. From the perspective of the public project sponsor, informing and communicating the project's results may therefore be recommended, because better awareness of the increase of services in the park may increase the number of visits (cf. Mäntymaa et al., 2018). This in turn

[2] Note that the value of private commercial services will be ultimately determined by the market if the park manager decides to allow these services to be provided in the park.

would increase the total welfare of citizens and the project's social profitability as long as overcrowding would not be a problem.

It was also found that if a visitor usually traveled to the park on foot or by bike, this tended to increase the number of visits compared to other means of transportation. This may reflect the fact that the journey to the park, as well as the stay in it, is a part of the experience of recreation and pleasure. On the other hand, in the past few decades, the City of Oulu has constructed an extensive and attractive network of bicycle paths, and one of the main routes from the city center to the north goes through the park. It is therefore probable that the development of the park's service will encourage more people cycling or walking to or from the center to choose this route more often.

If respondents usually visited the park alone instead of with someone else, it was found that they would visit the park more often than others. This may indicate that the place is also an attractive recreation destination, if a person has no one to accompany them. However, this may also suggest that it is easier to make a visit alone than with someone else. By walking, running, or cycling, people may thus direct their daily outdoor recreation and exercises to and through the park more often than before. The result that the importance of a usual trip to the former park tended to increase the number of visits in the future is obvious. If a person considered the park important in its former state with lower levels of services, it is understandable that he/she would see it as more enjoyable if the quality of services were to increase in the future, and would therefore visit the park even more often.

In relation to socio-demographic characteristics, it was found that if the respondents' highest level of education was vocational school, they would visit the park more often, and if it was primary school, they would visit the park less often, than others. It is unclear why respondents' education was found to play such an important role in this study, although Bertram and Larondelle (2017), Calleja et al. (2017), and Loomis et al. (2000), for example, did not find this. One explanation may be the age and income of respondents. If the highest level of education is only primary school, the respondent may be young and less interested in nature than older people. Yet if the highest level of education is vocational school, income may be low, leading a person to choose complementary activities in their free time. To verify this, an analysis of the heterogeneity of respondents' preferences is needed.

With respect to the estimated model, as important as the characteristics of visitors and an average trip to the park are, it is noteworthy that many of the essential socio-economic variables such as gender, age, the number of children in a family, or employment status do not differ between respondents. This means that improving the park's services is enjoyed quite equally by all citizens. This may be good news from the perspective of the local government's land use planners, who should manage the city's services equally for everyone.

Regarding the use of the TC-BC method, we found that a mere switch from the actual to hypothetical situation decreased the assessed number of visits to the park. This difference is a reflection of changed plans for visits, but it may also at least partly reflect the effect of hypothetical bias. In any case, to use the results in policymaking, it may be important to employ a conservative estimate of a reconstruction and management project's value. In this respect, the result is positive, suggesting that respondents at least did not overestimate the number of possible future visits to the park, and therefore the project's value.

In relation to the park's future management, the results imply that both the improvement of the ecosystem and commercial services will provide the biggest benefits to citizens. In addition, as cultural services are also quite beneficial, the results seem to suggest that all types of service should be developed. However, this may not be useful advice for the park manager, because it may lead to conflict between the services' benefits. In addition, if there is a focus on respondents' positive attitudes, both to maintaining a natural state and accepting the development of other services, a certain dilemma can be noted. If the development of the commercial or cultural services required earth-moving and/or construction in the park, a conflict between development and the objective of maintaining park's natural state would certainly be observed. However, an interpretation of the results may be that citizens had a positive attitude to the construction of public buildings and spaces, but were also willing to preserve the park's natural state. Consequently, to develop commercial and cultural services, people may accept careful construction if natural values are taken into account. The park manager should therefore carefully balance citizens' different and conflicting objectives. For example, conflict can be avoided by concentrating cultural and commercial services in places where there are already structures in the park, and by avoiding construction in those parts of the park that are in a natural state.

Although the TC-CB method applied in this study has several advantages, as reviewed above, it also has limitations that should be considered in the interpretation of the results. The most important may be that the method only reveals use values, omitting other values from the analysis. As Loomis (2006b) notes, in addition to use values, it is important to include the existence and passive use values of park management and stream restoration in decision making (Hanauer & Reid, 2017). Although they do not visit and are not going to visit the park, it is probable that many people will be happy with and positively value the park if a brown trout population is restored to its streams, for example. Another weakness of the study may be the survey's geographical restriction. As participation in the survey was limited to the citizens of Oulu, the values of visitors from neighboring municipalities and the rest of the country were dismissed. If these aspects are considered, the results of the study only provide a conservative estimate or lower limit of the monetary values of Hupisaaret City Park.

One detail of the analysis may overestimate the park's recreational value. For simplicity, as an approximation of the travel costs, the average cost of a driving kilometer with a private car was used. As many of the visitors to the park travel there on foot or by bike, this cost may be too large, especially if traveling to the park is part of the benefit a visitor receives from it. On the other hand, the opportunity cost of the time used to travel to the park was not considered. In turn, this may lead to an underestimation of the value (Amoako-Tuffour & Martinez-Espiñeira, 2012).

Finally, one limitation of the interpretation of the study's results is that the values of an average citizen were mostly reported. Further analysis of the heterogeneity of visitor preferences may provide useful insights into the results. The assessments of a set of attitudinal statements included in the survey may provide us with the possibility of applying multivariate methods – a principal component analysis, for example – to assess the values of the different respondent groups. In addition, as the survey produced panel data, it is possible to elaborate this by using a latent class model to identify different segments of visitors, for example. Such an analysis may reveal groups of visitors (e.g. winners and losers) with their relative sizes that are unobservable with the random effect specification of the negative binomial model applied in this study. These methods will be put to use in the study's next stage.

CRediT authorship contribution statement

Erkki Mäntymaa: Conceptualization, Data curation, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing - original draft, Writing - review & editing. **Mikko Jokinen:** Conceptualization, Data curation, Investigation, Visualization, Writing - original draft, Writing - review & editing. **Artti Juutinen:** Conceptualization, Methodology, Software, Supervision, Writing - original draft, Writing - review & editing. **Tuija Lankia:** Formal analysis, Methodology, Writing - original draft, Writing - review & editing. **Pauliina Louhi:** Conceptualization, Funding acquisition, Project administration, Resources, Writing - original draft, Writing - review & editing.

Table B1
Parameter estimates of citizens' TC-BC model, including travel costs and hypothetical attributes, and excluding socioeconomic controls.

	Coefficient	Standard Error
Constant	2.37991***	0.07363
TRAUT	0.17434***	0.03241
EVENT	0.11769***	0.03662
SERV	0.16700***	0.03838
TRAVCOST	−0.02581	0.01944
a	2.75176***	0.25276
b	1.21698***	0.10699
Fit statistics	Log likelihood function	−3236.69055
	AIC	6487.4
	AIC/n	5.406
	n (observations)	1200
	Panel (individuals)	300

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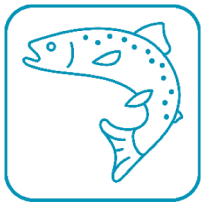
Appendix A

Alternative 2 of the reconstruction and management project.

Population of brown trout: A reproductive brown trout population will be restored to the park.



Happenings or events: No development in the number of happenings or events. In the park, sports, nature or cultural happenings or events will be organized as at present.

Services: In the park, at least one cafeteria-restaurant is open all year round.

During the next 12 months, how many times would you visit the park if this management alternative were realized?
In summer (from May to September) _____ times
In winter (from October to April) _____ times

Appendix B

References

Adamowicz, W., Louviere, J., & Williams, M. (1994). Combining revealed and stated preference methods for valuing environmental amenities. *Journal of Environmental Economics and Management, 26*, 271–292. https://doi.org/10.1006/jeem.1994.1017.

Amoako-Tuffour, J., & Martínez-Espiñeira, R. (2012). Leisure and the net opportunity cost of travel time in recreation demand analysis: An application to Gros Morne National Park. *Journal of Applied Economics, 15*, 25–49. https://doi.org/10.1016/S1514-0326(12)60002-6.

Armbrecht, J. (2014). Use value of cultural experiences: A comparison of contingent valuation and travel cost. *Tourism Management, 42*, 141–148. https://doi.org/10.1016/j.tourman.2013.11.010.

Arnberger, A., & Eder, R. (2011). The influence of age on recreational trail preferences of urban green-space visitors: A discrete choice experiment with digitally calibrated

images. *Journal of Environmental Planning and Management, 54*, 891–908. https://doi.org/10.1080/09640568.2010.539875.
Bae, H. (2011). Urban stream restoration in Korea: Design considerations and residents' willingness to pay. *Urban Forestry & Urban Greening, 10*, 119–126. https://doi.org/10.1016/j.ufug.2011.02.001.
Barry, L., van Rensburg, T. M., & Hynes, S. (2011). Improving the recreational value of Ireland's coastal resources: A contingent behavioural application. *Marine Policy, 35*, 764–771. https://doi.org/10.1016/j.marpol.2011.01.009.
Ben-Akiva, M., & Morikawa, T. (1990). Estimation of switching models from revealed preferences and stated intensions. *Transportation Research Part A, 24*, 485–495. https://doi.org/10.1016/0191-2607(90)90037-7.
Bertram, C., Ahtiainen, H., Meyerhoff, J., Pakalniete, K., Pouta, E., & Rehdanz, K. (2020). Contingent behavior and asymmetric preferences for baltic sea coastal recreation. *Environmental and Resource Economics, 75*(1), 49–78. https://doi.org/10.1007/s10640-019-00388-x.
Bertram, C., & Larondelle, N. (2017). Going to the woods is going home: recreational benefits of a larger urban forest site — A travel cost analysis for Berlin, Germany. *Ecological Economics, 132*, 255–263. https://doi.org/10.1016/j.ecolecon.2016.10.017.
Bertram, C., Meyerhoff, J., Rehdanz, K., & Wüstemann, H. (2017). Differences in the recreational value of urban parks between weekdays and weekends: A discrete choice analysis. *Landscape and Urban Planning, 159*, 5–14. https://doi.org/10.1016/j.landurbplan.2016.10.006.
Bunch, D. S., Bradley, M., Golob, T. F., Kitamura, R., & Occhiuzzo, G. P. (1993). Demand for clean-fuel vehicles in California: A discrete-choice stated preference pilot project. *Transportation Research Part A: Policy and Practice, 27*, 237–253. https://doi.org/10.1016/0965-8564(93)90062-P.
Calleja, A., Díaz-Balteiro, L., Iglesias-Merchan, C., & Soliño, M. (2017). Acoustic and economic valuation of soundscape: An application to the 'Retiro' Urban Forest Park. *Urban Forestry & Urban Greening, 27*, 272–278. https://doi.org/10.1016/j.ufug.2017.08.018.
Cameron, C. A., & Trivedi, P. K. (1998). *Regression Analysis of Count Data. Econometric Society Monographs No 30*. New York: Cambridge University Press.
Cho, S.-H., Bowker, J., English, D., Roberts, R., & Kim, T. (2014). Effects of travel cost and participation in recreational activities on national forest visits. *Forest Policy and Economics, 40*, 21–30. https://doi.org/10.1016/j.forpol.2013.12.004.
Christie, M., Hanley, N., & Hynes, S. (2007). Valuing enhancements to forest recreation using choice experiment and contingent behaviour methods. *Journal of Forest Economics, 13*, 75–102. https://doi.org/10.1016/j.jfe.2007.02.005.
City of Oulu (2020a). Hupisaarten purojen kunnostaminen (The reconstruction of the streams of Hupisaaret City Park), Retrieved in 5 March, 2020 from https://www.ouka.fi/oulu/ymparisto-ja-luonto/hupisaarten-purojen-kunnostaminen.
City of Oulu (2020b). Oulun kaupungin kehittämissalkut (Portfolios of development actions of the City of Oulu), Retrieved in 3 June, 2020 from https://www.oukapalvelut.fi/kehittamishankkeet/Hankekortti1.asp?ID=686.
Collins, A., Rosenberger, R., & Fletcher, J. (2005). The economic value of stream restoration. *Water Resources Research, 41*, W02017. https://doi.org/10.1029/2004WR003353.
Downward, P., Lumsdon, L., & Weston, R. (2009). Visitor expenditure: The case of cycle recreation and tourism. *Journal of Sport & Tourism, 14*, 25–42. https://doi.org/10.1080/14775080902847397.
Englin, J., & Shonkwiler, J. (1995). Estimating social welfare using count data models: An application to long-run recreation demand under conditions of endogenous stratification and truncation. *The Review of Economic and Statistics, 77*, 104–112. https://www.jstor.org/stable/2109996?seq=1#metadata_info_tab_contents.
Ezebilo, E. E., Boman, M., Mattsson, L., Lindhagen, A., & Mbongo, W. (2015). Preferences and willingness to pay for close to home nature for outdoor recreation in Sweden. *Journal of Environmental Planning and Management, 58*, 283–296. https://doi.org/10.1080/09640568.2013.854196.
Freeman, A. M., III (2003). *The measurement of environmental and resource values. Theory and methods*. Washington, DC: RFF Press.
Haab, T. C., & McConnell, K. E. (2002). Valuing environmental and natural resources: The econometrics of non-market valuation. Cheltenham – Edward Elgar.
Haase, D., Larondelle, N., Andersson, E., Artmann, M., Borgström, S., Breuste, J., et al. (2014). A quantitative review of urban ecosystem service assessments: Concepts, models, and implementation. *Ambio, 43*, 413–433. https://doi.org/10.1007/s13280-014-0504-0.
Hanauer, M. M., & Reid, J. (2017). Valuing urban open space using the travel-cost method and the implications of measurement error. *Journal of Environmental Management, 198*, 50–65. https://doi.org/10.1016/j.jenvman.2017.05.005.
Hanley, N., Bell, D., & Ivarez-Farizo, B. (2003). Valuing the benefits of coastal water quality improvements using contingent and real behaviour. Environmental and Resource Economics 24, 273–285, https://doi.org/10.1023/A:1022904706306.
Harrison, G. W., & Rutström, E. E. (2008). Experimental Evidence on the Existence of Hypothetical Bias in Value Elicitation Methods. In: Plott, C. R., Smith, V. L. (Eds.) Handbook of experimental economics results (Vol. 1, pp. 752–767), https://doi.org/10.1016/S1574-0722(07)00081-9.
Hynes, S., & Greene, W. (2013). A Panel travel cost model accounting for endogenous stratification and truncation: A latent class approach. *Land Economics, 89*, 177–192. https://doi.org/10.3368/le.89.1.177.
Hökby, S., & Söderqvist, T. (2003). Elasticities of demand and willingness to pay for environmental services in Sweden. *Environmental and Resource Economics, 26*, 361–383. https://doi.org/10.1023/B:EARE.0000003581.97411.75.
Iamtrakul, P., Teknomi, K., & Hokao, K. (2005). Public park valuation using travel cost method. *Proceedings of the Eastern Asia Society for Transportation Studies, 5*, 1249–1264. http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.76.2406&rep=rep1&type=pdf.
Johnston, R. J., Boyle, K. J., Adamowicz, W.(V.), Bennett, J., Brouwer, R., Cameron, T. A., et al. (2017). Contemporary guidance for stated preference studies. *Journal of the Association of Environmental and Resource Economists, 4*, 319–405. https://doi.org/10.1086/691697.
Khan, H. (2009). Willingness to pay and demand elasticities for two national parks: Empirical evidence from two surveys in Pakistan. *Environment, Development and Sustainability, 11*, 293–305. https://doi.org/10.1007/s10668-007-9111-6.
Lankia, T., Neuvonen, M., & Pouta, E. (2019). Effects of water quality changes on the recreation benefits of swimming in Finland: Combined travel cost and contingent behavior model. *Water Resources and Economics, 25*, 2–12. https://doi.org/10.1016/j.wre.2017.10.002.
Landry, C. E., Allen, T., Cherry, T., & Whitehead, J. C. (2012). Wind turbines and coastal recreation demand. *Resource and Energy Economics, 34*, 93–111. https://doi.org/10.1016/j.reseneeco.2011.10.001.
Loomis, J. (2006). A comparison of the effect of multiple destination trips on recreation benefits as estimated by travel cost and contingent valuation methods. *Journal of Leisure Research, 38*, 46–60. https://doi.org/10.1080/00222216.2006.11950068.
Loomis, J. (2006). Importance of including use and passive use values of river and lake restoration. *Journal of Contemporary Water Research and Education, 134*, 4–8. http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.843.1756&rep=rep1&type=pdf.
Loomis, J., Kent, P., Strange, L., Fausch, K., & Covich, A. (2000). Measuring the total economic value of restoring ecosystem services in an impaired river basin: Results from a contingent valuation survey. *Ecological Economics, 33*, 103–117. https://doi.org/10.1016/S0921-8009(99)00131-7.
Louviere, J. J. (1992). Experimental choice analysis: Introduction and overview. *Journal of Business Research, 23*, 291–297. https://doi.org/10.1016/0148-2963(91)90015-P.
Mäntymaa, E., Juutinen, A., Tyrväinen, L., Karhu, J., & Kurttila, M. (2018). Participation and compensation claims in voluntary forest landscape conservation: The case of the Ruka-Kuusamo tourism area, Finland. *Journal of Forest Economics, 33*, 14–24. https://doi.org/10.1016/j.jfe.2018.09.003.
Melichar, J., & Kaprová, K. (2013). Revealing preferences of Prague's homebuyers toward greenery amenities: The empirical evidence of distance–size effect. *Landscape and Urban Planning, 109*, 56–66. https://doi.org/10.1016/j.landurbplan.2012.09.003.
Mieno, T., Shoji, Y., Aikoh, T., Arnberger, A., & Eder, R. (2016). Heterogeneous preferences for social trail use in the urban forest: A latent class model. *Urban Forestry & Urban Greening, 19*, 20–28. https://doi.org/10.1016/j.ufug.2016.06.016.
Milon, J. W. (1989). Contingent valuation experiments for strategic behavior. *Journal of Environmental Economics and Management, 17*, 293–308. https://doi.org/10.1016/0095-0696(89)90022-3.
Morancho, A. B. (2003). A hedonic valuation of urban green areas. *Landscape and Urban Planning, 66*, 35–41. https://doi.org/10.1016/S0169-2046(03)00093-8.
More, T. A., Stevens, T., & Allen, P. G. (1988). Valuation of urban parks. *Landscape and Urban Planning, 15*, 139–152. https://doi.org/10.1016/0169-2046(88)90022-9.
Murphy, J. J., Allen, P. G., Stevens, T. H., & Weatherhead, D. (2005). A meta-analysis of hypothetical bias in stated preference valuation. *Environmental and Resource Economics, 30*, 313–325. https://doi.org/10.1007/s10640-004-3332-z.
Niskala, K. (2005). Hurmaavat Hupisaaret (Fascinating Hupisaaret). Painotalo Suomenmaa – Oulu.
Norman, J., Ellingson, L., Boman, M., & Mattson, L. (2010). The value of forests for outdoor recreation in southern Sweden: Are broadleaved trees important? *Ecological Bulletin, 53*, 21–31. https://www.jstor.org/stable/41442016.
Ovaskainen, V., Neuvonen, M., & Pouta, E. (2012). Modelling recreation demand with respondent-reported driving cost and stated cost of travel time: A Finnish case. *Journal of Forest Economics, 18*, 303–317. https://doi.org/10.1016/j.jfe.2012.06.001.
Parsons, G. (2003). The travel cost model. In P. Champ, K. Boyle, & T. Brown (Eds.), *A primer on Nonmarket valuation* (pp. 187–233). Dordrecht: Kluwer Academic Publishers.
Poudyal, N. C., Hodges, D. G., & Merrett, C. D. (2009). A hedonic analysis of the demand for and benefits of urban recreation parks. *Land Use Policy, 26*, 975–983. https://doi.org/10.1016/j.landusepol.2008.11.008.
Pöyry (2001). Hupisaarten puistoalueen yleissuunnitelma (Principal plan of the area of Hupisaaret City Park), Jaakko Pöyry Infra, 95 pp, http://oulu.ouka.fi/tekninen/lasaretinvayla/013_yleissuunn/puistoalueenyleissuunn.pdf.
Ready, R., Poe, G., Lauber, T., Connelly, N., Stedman, R., & Rudstam, L. (2018). The potential impact of aquatic nuisance species on recreational fishing in the Great Lakes and Upper Mississippi and Ohio River Basins. *Journal of Environmental Management, 206*, 304–318. https://doi.org/10.1016/j.jenvman.2017.10.025.
Rosenthal, D. (1987). The necessity for substitute prices in recreation demand analyses. *American Journal of Agricultural Economics, 69*, 828–837. https://doi.org/10.2307/1242194.
Sander, H., & Haight, R. G. (2012). Estimating the economic value of cultural ecosystem services in an urbanizing area using hedonic pricing. *Journal of Environmental Management, 113*, 194–205. https://doi.org/10.1016/j.jenvman.2012.08.031.
Sarvilinna, A., Lehtoranta, V., & Hjerppe, T. (2017). Are urban stream restoration plans worth implementing? *Environmental Management, 59*, 10–20. https://doi.org/10.1007/s00267-016-0778-z.
Shrestha, R. K., Stein, T. V., & Clark, J. (2007). Valuing nature-based recreation in public natural areas of the Apalachicola River region, Florida. *Journal of Environmental Management, 85*, 977–985. https://doi.org/10.1016/j.jenvman.2006.11.014.

Statistics Finland (2020). Preliminary population structure by area, 2020, Retrieved in 9 March, 2020 from http://pxnet2.stat.fi/PXWeb/pxweb/fi/StatFin/StatFin_vrm_vamuu/statfin_vamuu_pxt_11lj.px/table/tableViewLayout1/.

Tavárez, H., & Elbakidze, L. (2019). Valuing recreational enhancements in the San Patricio Urban Forest of Puerto Rico: A choice experiment approach. *Forest Policy and Economics, 109*, 102004. https://doi.org/10.1016/j.forpol.2019.102004.

Traficom (2020). Laskelmia autoilun kustannuksista (Calculations of the costs of private car driving), The Finnish Transport and Communications Agency, Retrieved in 23 March, 2020 from https://www.traficom.fi/fi/ajavaihtoehtoa/vttn-laskelma-autoilun-kustannuksista; https://www.traficom.fi/fi/ajavaihtoehtoa/vernen-laskelma-autoilun-kustannuksista.

Tyrväinen, L., & Miettinen, A. (2000). Property prices and urban forest amenities. *Journal of Environmental Economics and Management, 39*, 205–223. https://doi.org/10.1006/jeem.1999.1097.

Vecchiato, D., & Tempesta, T. (2013). Valuing the benefits of an afforestation project in a peri-urban area with choice experiments. *Forest Policy and Economics, 26*, 111–120. https://doi.org/10.1016/j.forpol.2012.10.001.

Whitehead, J., Pattanayak, S., Van Houtven, G., Gelso, B., 2008. Combining revealed and stated preference data to estimate the nonmarket value of ecological services: An assessment of the state of the science. Journal of Economic Surveys 22, 872–908, https://doi.org/10.1111/j.1467-6419.2008.00552.x.

Zhang, F., Wang, X., Nunes, P., & Ma, C. (2015). The recreational value of gold coast beaches, Australia: An application of the travel cost method. *Ecosystem Services, 11*, 106–114. https://doi.org/10.1016/j.ecoser.2014.09.001.