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Caring for Blue-Green Solutions (BGS) in Everyday Life: An Investigation of Recreational Use, Neighborhood Preferences and Willingness to Pay in Augustenborg, Malmö

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Abstract: In this article, we explore the production of socio-cultural values around blue-green solutions (BGS) through the perspective of care. We explore how values and preferences are formed through the complexity of everyday life engagements in a BGS environment. The data come from a questionnaire answered by 328 households in the neighborhood of Augustenborg in Malmö, Sweden. The questionnaire collects detailed information about inhabitants' possible recreational use (through Likert scale questions) and willingness to pay (WTP) (estimated through contingent valuation). The study evaluates if and how people care to use, care to live with, and care to pay for BGS. The result shows that people in Augustenborg relate in different and sometimes contradictory ways to BGS. A well-used BGS environment does not per se make the environment successful or result in people preferring a BGS environment in the future. Building awareness about BGS seems to increase the willingness to pay, whereas recreational use seems to decrease it. The study reveals a landscape of care that is constantly being formed and transformed. This suggests that both planning and research needs to focus more on the relation between BGS and social use over time.

Keywords: affordance; blue-green solutions; matters of care; measure–value environment; urban design; willingness to pay

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1. Introduction

Urbanization is rising dramatically, and two-thirds of the world's inhabitants are expected to live in urban environments by 2050 [1]. This affects urban liveability and challenges humans' expectations on their everyday life [2]. Climate change is an additional source of pressure on urban areas [3], where the extreme, frequent, intense rainfalls are one of the many challenges added to the already complicated risk-landscape of urban development [4]. The increase in extreme rainfalls also calls for complementary services to those offered by existing stormwater infrastructure.

Blue-green solutions (BGS) are open facilities, such as raingardens, ponds, and swales, that are usually added to the urban landscape to handle urban runoff. They do not only retain the runoff and relieve hydraulic pressure from the existing drainage networks but can for example also contribute to the mitigation of urban heat islands and play an esthetic role in the urban landscape (i.e., [5]). In addition, natural open space that is available to be experienced and used by inhabitants is beneficial for urban liveability [6]. Compared to traditional drainage systems via underground pipe networks, BGS are more flexible and efficient in handling stormwater. However, they are spatially demanding.

The spatial aspects of BGS, such as planning, design, and construction, have been mostly understood in relation to stormwater and flood management functionality [7,8]. However, as BGS become permanent components of urban open space, they also need to be socially embedded [9] and adapt to the ongoing and ever-changing daily life. To increase the societal benefits of BGS, it is important to understand how they can provide better support to everyday life [10].

Previous research has acknowledged co-benefits of BGS for urban environments (i.e., [11,12]). Some studies discuss the social aspects of BGS through the concept of ecosystem services, for example highlighting their impact on human health [13], or confirming their additional esthetic, recreational, spiritual, and educational values [14]. Sañudo-Fontaneda and Robina-Ramírez [15] also acknowledge the value of community perceptions in the transition towards flood resilience. However, there are not enough studies on how people perceive BGS and interpret their everyday life as influenced by such implementations. What BGS bring to people in real life situations is still unclear, and, therefore, embedding them in public space is a critical challenge. Public space is complex in its nature and adding BGS brings new layers of complexity to the nature–culture landscape of urban life [16]. For this research, an urban environment with BGS can be described as a specific kind of urban green space assigned to handle flooding.

The experiential dimensions of the urban green space and materiality of everyday practices have been addressed in some studies which, in some aspects, became inspiration for this research. Petersen [17] explored how visiting a space, doing activities there, and experiencing it developed into patterns of use in everyday life. His findings indicate that people primarily use urban green space in their free time as recreational spaces for solitude, for being together, and experiencing civic diversity. Recreational use value brings life to urban space, and proximity to outdoor green space may encourage frequent use [18,19]. Furthermore, Lamond and Everett [20] acknowledge the correlation between recreational functionalities of BGS and the attitudes and meanings of the users. In addition, Baptiste, Foley, and Smardon [21] found that residents' knowledge level of environmental problems is related to their preferences. Preferences are generally influenced by individual perceptions of the produced benefits, which vary between different users. However, users' preferences have not been sufficiently explored [22]. Some socio-cultural values have been evaluated in previous research on urban green space, but these studies focus mostly on just one dimension [23,24]. Multi-dimensional studies on how different preferences interact in relation to climate adaptation measures are quite few [25].

Developing insight into users' assessment and understanding how experiential aspects form preferences can play a vital role in policymaking and enhance the use in certain environments [20,25,26]. On the other hand, implementation of BGS brings extra costs to municipalities, and policymakers often wish to involve the inhabitants in these expenses. This also calls for a better understanding of what BGS mean to people in more monetary terms. Although a great deal of effort has been concentrated on estimating the cost of BGS, their impact on everyday life has been less considered in the assessments [5,27]. Some research has addressed economic valuation in relation to public preferences regarding urban green space recreational values from different points of view, i.e., [28,29]. However, little or no research has discussed users' preferences in reference to BGS-driven recreational values and the material conditions that they derive from BGS.

In this study, we explore the production of socio-cultural values around BGS through the perspective of *care*. Care is here seen as the work of reproduction and maintenance around everyday life matters of concern, and as such, it has both affective and ethical implications [30]. More specifically, the present study investigates how BGS affect what people care for in their spatial environment and how they care for it. This study has been built on three different questions: (1) if and how people care to use the BGS environment in their everyday life; (2) if and how they would care to live with BGS in the future; and

(3) if and how much, they care to pay for this choice. We thus want to critically discuss the (co)beneficiality of BGS and know how people form patterns of care in relation to BGS through the complexity of everyday life involvements and experiences. The present study especially investigates recreational use value, preferences, and willingness to pay (WTP) and investigates why citizens might prefer urban space with BGS (or not). However, these perceptions and preferences cannot, we argue, be understood as isolated but benefit from being seen as related to the ongoing production and reproduction of care that we develop in relation to the neighborhood where we live. The study thus ends by looking at preferences as related to the development of care over time. Moreover, by revealing some socio-spatial economic impacts, this paper finally argues for the necessity of more detailed social insights into the hydraulic design of BGS. Our hope here is that the findings can influence policy guidance for planners and contribute to the planning and design of BGS that people feel concerned about and care for over time.

The required data are gathered from the Inhabitants' answers to multiple designed questions in a questionnaire that was sent to all (1887) households in Malmö's Augustenborg neighborhood, where BGS are hydraulically and hydrologically well-functioning. The questionnaire includes five and seven Likert scale questions about use and preferences in relation to BGS, a two-choice photomontage preference question, willingness to pay (WTP) questions with contingent valuation method, and some background questions at the end.

2. Theoretical Background

2.1. Care and Everyday Life

The notion of care does not necessarily refer to mutual relations between two specific parties; rather it is a relational entity constituted through a multitude of intersecting socio-spatial conditions and actors [31]. Here, care is identified as an experiential dimension of life in the intersection between human and non-human conditions. What we care for and how we care are constantly in becoming, and "what care can mean in each situation cannot be resolved by ready-made formulas" [30] (p. 60). Care is an entity that human beings do and redo perpetually, and is shaped through "tensions and relations" in an environment [32]. To care is both to be affected and to affect, and as we develop matters that we care for over time, we also develop preferences and perceptions. Care is, in this sense, something which our perceptions and preferences cannot fail to resonate against.

Taking the perspective of care helps us to acknowledge entities that might have been left out in decision making. Traditionally, urban design has been seen as problem solver that is implemented to lead the users' lives in different ways. Through the notion of care, we want to show how urban design also relates to aspects of on-going affective "sense-making" in everyday life [33], aspects which have not yet been much acknowledged in planning policies and guidelines. In the paper, we are thus interested in how care has evolved through the ongoing relation with a specific BGS environment over time. To address these relations and tensions between care and a specific environment, we will use two different perspectives: affordance theory and the notion of a measure–value environment.

2.2. Affordance Theory

James Gibson introduced the notion of affordance as possibilities for action that an environment offers to animals, including humans [34,35]. Norman [36] divides affordance into perceived affordance, as allowed through the appearance of an artefact, and real affordance, as the physical characteristics that allow functioning. Hartson [37], coming from interaction design, classifies affordance into the four groups of cognitive, physical, sensory, and functional affordances. For him, cognitive affordance refers to Norman's perceived affordance. It is a design feature that facilitates knowing about something (such as proximity, which enables detecting an object). With physical affordance, he refers to Norman's real affordance as a design feature that helps you to physically do something (features such as the type of design, size, materiality that facilitate the object to be used, and bodily experienced). He calls cognitive and physical affordance "alliance in design" [37] (p. 319), giving a supporting role to the sensory affordance and defining it as a design feature associated with sensations attributed to the two previous groups of affordances. Hartson goes even further by introducing functional affordance as a design feature that connects physical actions (physical affordance) to usefulness. According to him, an object can afford adding purpose to an action when it usefully responds to a user's actions (such as making the usage stabilized in a user's life). These categories are interconnected, however. Preferences are formed based on our previous experiences, which have shaped our perceptions [38]. Affordances influence a user's experience of the environment [35]. If an environment affords important and meaningful actions for individuals that other environments cannot support, this environment will be preferred above the others [39]. Preference judgments are linked to people's needs and concerns [40]. Affordances are thus very much related to matters of concerns and care in a neighborhood. At the same time, matters of care and concern have a bearing on affordances and what the environment means to humans.

2.3. Measure–Value Environment

The design of BGS is often based on different quantifiable units, such as the amount of water, the size of an area, the amount of rain, costs, etc. However, as Brighenti [41] has noted, the unit is not just a unit. Units indicate not only quantitative happenings but also generate qualitative meanings. They form an environment in which we live. In order to depict the relation between quantities and social-spatial environments, Brighenti [42] considers two facets for evaluation and proposes the two sides as one extensive side (measures) and one intensive side (values). He criticizes the development of modern science for being centered on magnitude and neglecting the phenomenon of value. He also draws attention to values that sometimes are invisible but become present in measures. As an example, he refers to flags and explains "flags are wind made visible but just as flags do not exhaust the wind rushing through them, value is never fully tamed by any measuring apparatus or any actualized measurement" [42] (p. 227). A measure can thus make values visible, but they can never exhaust or give us a full picture of a specific value. So far, researchers and practitioners have elaborated mainly on investigations of the extensive measures of BGS, whereas qualitative properties and values, such as usefulness, care, meaning, etc., have remained largely understudied. As long as evaluation systems are seen as a static numerical course, measurements cannot really help us achieve more thorough assessments or comprehensions of a phenomenon. There is, however, a strong relationship between measure and value. For Brighenti [41], value exists before and after measure, and he uses the term "measure–value environment" as a way of capturing this heterogeneous and complex space. He refers to measure–value environment "as a theoretical lens through which the life of measures at large might be better understood, observed and studied" [41] (p. 25). Measures and values are intrinsically related, and for him, measures are "territorializing devices, that is, social territory-making acts" [41] (p. 25).

For us, the notion of measure–value environment is helpful because it allows us to acknowledge that a measure–value relation is seldom a simple or isolated one; instead, it sets different processes of (extensive and intensive) territorializations into play, producing complexities that needs to be traced and mapped. The notion of care is not necessarily produced in any systematic or logical way, and it is thus important to acknowledge that how people evaluate their environment can be quite complex and that different evaluations can both interact and counteract each other in different ways. Perhaps one could even argue that such counteractions are actually an indication of how different patterns of care have developed over time. As we develop matters of care, we also develop new and sometimes inherently different or even contradictory ways of taking stock of these matters.

3. Materials and Methods

The material for this article comes from answers provided by inhabitants of an urban neighborhood to some of the designed items in an extensive questionnaire. The questionnaire aimed to collect information about the interaction between everyday life and BGS, and it has enabled us to investigate everyday spatial and economic values and preferences of BGS, as well as the relation between these preferences.

3.1. Eco-City Augustenborg

Augustenborg is a residential neighborhood in the city of Malmö. Malmö is a coastal city in southern Sweden and the third largest city in the country (Figure 1). There are 3875 inhabitants (51% male and 49% female) in Augustenborg, residing in 1887 households [43]; these statistics were updated on 27 September 2019. The average disposable income (108,000 SEK) is lower compared with the average disposable income (152,000 SEK) in the Malmö municipality [43], as per data for 2012. Additionally, a larger fraction of the inhabitants in Augustenborg were born abroad (58%) in comparison with Malmö municipality, where 33% were born abroad. In addition, the inhabitants have a lower educational level compared with the average level for the municipality. The area is entirely owned by the municipal housing agency MKB and was built 1948–1952 in line with proposals put forth in *Bostadssociala utredningen*, a state investigation on housing from a social perspective [44,45]. Due to different socio-cultural issues, however, people started moving out of the area in the 1970s. The project Eco-city Augustenborg was initiated in 1998 in order to improve the area socially and ecologically through a sustainability perspective. One of the main drives behind the proposal of this urban transformation project was to make the area resilient against flooding, an issue which had been frequently problematic for the area in the past. The goal was to manage 70% to 90% of the stormwater runoff through different types of BGS and improve the waste management in the area [46]. BGS were applied along two northern and southern systems with a drainage area of approximately 16 hectares [47]. In addition, the transformation of Augustenborg was used as a testbed to prototype a variety of different BGS, waste separation systems, solar panels, and other green innovations. This experiment was performed in collaboration with the residents, which has also improved stakeholder participation (more details on the experience of Augustenborg and its transformation is provided by Månsson and Persson in [48]).

Based on extensive investigations in Augustenborg through combined rainfall-runoff measurements and hydrodynamic modelling, it was found that the implemented BGS not only retain runoff and decrease the peak flow from the neighborhood by about 80% under intense rainfall but also considerably decrease the area of flooded surfaces by 70% compared to before the transformation [49]. Increased flood mitigation capacity and resilience in Augustenborg have dramatically reduced flood damage in the area [50], meaning that the main objective of the blue-green transformation has been fulfilled. Eco-city Augustenborg (implemented 1999–2003) is also considered a testbed for sustainable development, and BGS are implemented mainly in publicly accessible green space. BGS such as green roofs that are inaccessible to the public are out of the scope of this study. In 2010, the project won the UN World Habitat Award for its approach to urban sustainability in a city district. This specific urban project is selected for this case study research because it is a pioneer flood resilient urban area. This means that the BGS have had enough time to be tested and interpreted by the area's inhabitants, as well as to be enrolled in the different tensions and relations of care that form the inhabitants' daily lives.

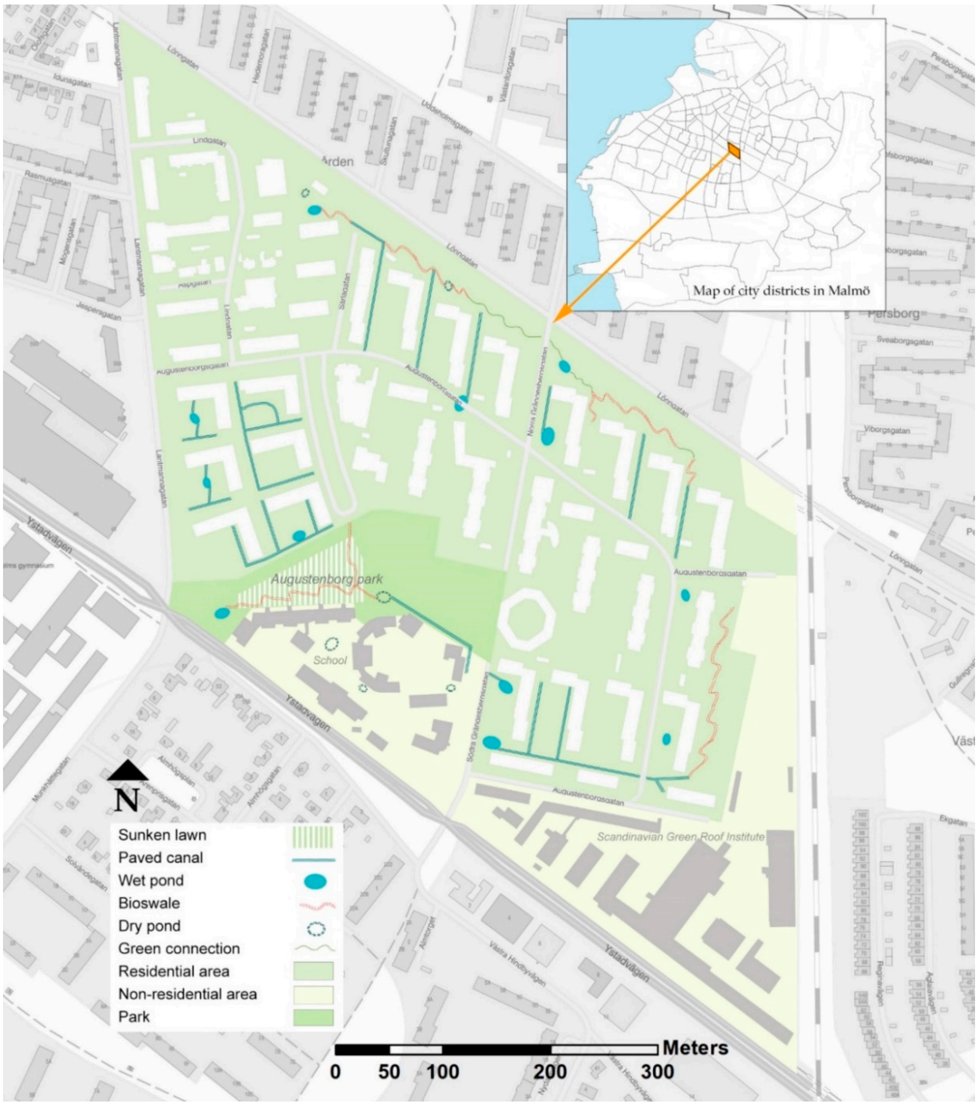

Figure 1. Map of Augustenborg showing blue-green solutions. Source: [16].

3.2. Data Acquisition

To understand what BGS mean to people in Augustenborg in their everyday lives, we designed a questionnaire as a tool to study people's experiences and preferences about BGS. The questionnaire was designed with two main sections. The first part addresses socio-spatial concerns and includes designed scaled-items related to the inhabitants' use and experiences in relation to BGS, whereas the second part includes items with socio-economic concerns. Some open-ended questions were also asked at the end of each subsection. The questionnaire, which was in Swedish, went through two pilot studies, first with some experts and later with a group of inhabitants from Augustenborg. The questionnaires were then distributed by mail to all households in Augustenborg in November 2018. The questionnaires were collected by the end of the year, partially by being mailed back and partially by being given to the MKB office in the area. A reminder was sent out to the respondents. Respondents that answered the questionnaire and handed it over to the MKB office received two "triss" lottery tickets from Sweden's gaming company (Svenska Spel), corresponding to a value of SEK 60 (6.06 Euro).

3.2.1. Questionnaire Design

For the urban design section, we asked inhabitants to rate a number of statements on five and seven Likert scales about their use and perceptions of the BGS. We provided them with scales to assess specific items. The items intended to capture what the area with BGS meant to people in their urban life (and how these meanings co-developed with the environment) were designed with inspiration from affordance theory. In order to achieve an in-depth overview of the affordance as a process, we formulated the questions according to different kinds of affordances.

The section focusing on recreational use and experience of BGS had two sub-sections. The first dealt more with perceived/cognitive affordance and real/physical affordance and will be discussed in this paper. The second sub-section asked more about sensual and temporal possibilities that BGS bring to the built environment, which is beyond the scope of the current paper.

The physical attributes play a vital role in expanding the affordances offered in public space [40]. To collect information about the affordances, we started by asking about the geographic proximity to BGS to find out whether the respondents were aware of their presence in the neighborhood. The distance to urban green space is often stated as playing the most important role for the users' frequency of visits [51]. Proximity is subjective, and people's perceptions of proximity differ. Thus, we asked how close any type of the BGS (shown through illustration in the questionnaire) (Figure 2) was to the respondent's home. This was asked for different types of BGS: sunken lawn, canal, and wet pond. Respondents were given five choices from Likert scales (1 = No, definitely not, and 5 = Yes, definitely). This information helped us later when exploring if the proximity to BGS influences inhabitants' recreational use.

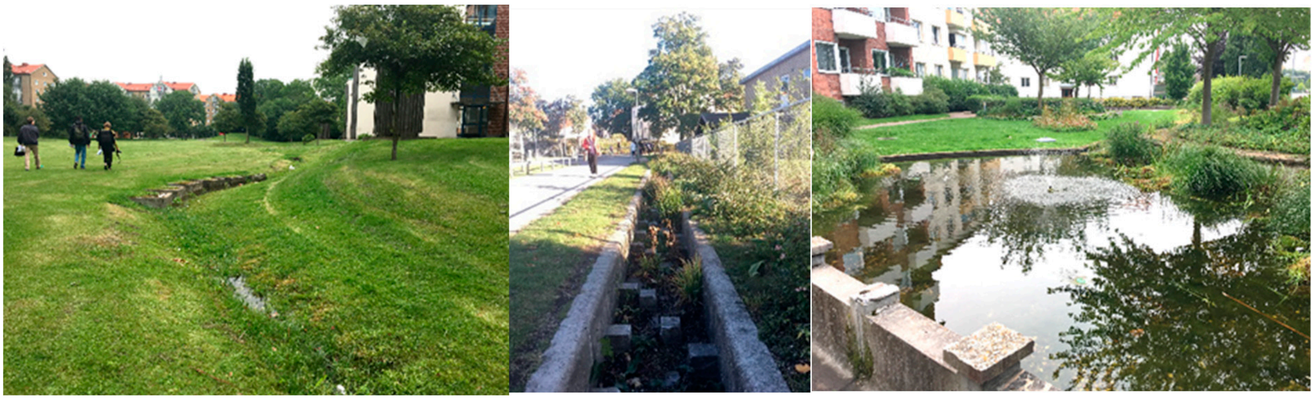

Figure 2. From left to right: Sunken lawn (Augustenborg remodelled park); sample of paved canal; sample of wet pond. Photographs by Misagh Mottaghi.

In terms of physical affordance, we asked about the use of the identified areas, specifically focusing on possibilities for recreational engagement with BGS. We inquired about situations in which the respondent encountered the area with any one of the above-mentioned BGS.

- I go close to the BGS when walking, biking, running, jogging, or dog-walking.
- I go close to the BGS, sitting for a while, looking around/thinking/spending time, talking to/hanging out with others, playing games/playing/doing sports, or reading.

Inspired by Gehl [52], the first activity group was categorized as coming-and-going activities, and the second as stationary activities that require staying in one place. Respondents were given five choices on a Likert scale (1 = Never, and 5 = Everyday). Inquiries were made about both the intention of use and the frequency of use, aimed to relate the real affordance to the purposefulness (functional affordance) in terms of how stabilized the use became in everyday life.

Recreational values of urban green space usually vary between weekdays and weekends, but this depends on context (i.e., [53]). Accordingly, for better understanding of the use value, we asked about the average daily time spent in Augustenborg's outdoor environment in summer/winter AND on weekends/weekdays. Respondents were given four choices (less than 30 min, 30–60 min, 1–3 h, more than 3 h). We also asked the respondents how long they had been living in Augustenborg. Respondents were given five choices (less than a year, 1–2 years, between 2 and 5 years, 5–10 years, more than 10 years). To learn more about the spatial dimensions, the respondents were also asked to write the number of the floor on which they lived. Respondents were given five choices (ground floor, 1st floor, 2nd floor, 3rd–7th floor, more).

Moreover, to estimate each inhabitant's understanding of the concept of flood resilience behind the implementation of BGS in Augustenborg's outdoor environment, an item was designed as follows: BGS are there to protect against flooding from rain. Respondents were given five choices on a Likert scale (1 = No, definitely not, and 5 = Yes, definitely). Finally, we asked about the respondents' recommendations for future blue-green areas with larger water surfaces in Malmö. Respondents were given five choices on a Likert scale (1 = No, definitely not, and 5 = Yes, definitely).

Following the section relating to use and experience, the respondents were given a hypothetical scenario to elicit each respondent's preference for BGS relative to traditional solutions with underground pipes to handle the rainwater. The question was asked with the use of photomontage technique, and the respondents were asked to choose between an area with BGS and the same area without BGS (Figure 3). The respondents were informed that the rental cost of the apartment was the same in both areas, that both solutions were considered to be equally good at handling the rainwater, and, hence, that the risk of floods was equal. The question was phrased thus:

> "Assume that you will move to another residential area. The new apartment is the same size as your present apartment and you have the option to choose between two similar residential areas: Area 1 and Area 2. The only difference between the residential areas is the way they handle the rainwater."

Figure 3. Photomontage question asking the respondents about their neighborhood preference for living with or without BGS. Photographs by Misagh Mottaghi.

After asking in which of the two residential areas the respondent would like to live, the respondents were asked WTP-related questions. Both questions shall be seen as an evaluation of which technical solution the respondent prefers. The first is asked without a monetary valuation but can be seen as consequential because only one area can be chosen. The second follow-up questions measure the strength of the preferences in monetary terms. Several methods are available to determine non-market benefits of BGS, such as contingent valuation, choice experiments, and the hedonic price method [54]. In this study, we use the contingent valuation method. The Choice Experiment Method was not used, as such a design would have made the questionnaire too time-consuming for the respondent. As Augustenborg is a residential area with rental properties, the hedonic price method is not applicable. The questionnaire design for the WTP part of the survey follows [54].

If respondents chose Area 1, they were asked to state how much (maximum) they would be willing to pay extra per month to live in Area 1. The respondent was told that the amount would be added to the rent of the apartment. The corresponding question was also asked to respondents that had chosen Area 2. As open-ended WTP formats are believed to yield an unusually high percentage of responses of € 0 [55], we used a payment card in which the respondents were asked to state their maximum WTP. The payment card format is also more informative and cheaper to implement than a dichotomous choice format [54,55]. Because we are carrying out a case study in a specific residential area with a limited sample size and unknown response rate, efficiency from a statistical point of view was considered as important in choosing the WTP response format. The intervals in the payment card (Table 1) were tested in a pilot survey.

Table 1. Payment card used in the survey.

☐ 0 SEK/Month (0 €/month)	☐ 150 SEK/Month (15.27 €/month)	☐ Don't know
☐ 10 SEK/Month (1.02 €/month)	☐ 200 SEK/Month (20.37 €/month)	
☐ 25 SEK/Month (2.55 €/month)	☐ 250 SEK/Month (25.46 €/month)	
☐ 50 SEK/Month (5.09 €/month)	☐ 300 SEK/Month (30.55 €/month)	
☐ 75 SEK/Month (7.64 €/month)	☐ 400 SEK/Month (40.73 €/month)	
☐ 100 SEK/Month (10.18 €/month)	☐ >400 SEK/Month (>40.73 €/month)	

Before respondents answered the WTP question, they were reminded of the budget constraints. An increase in the rent of the apartment was chosen as the payment vehicle because Augustenborg consists of rental properties. The WTP question was followed by additional questions, for instance, to identify protest answers and measure respondents' uncertainty about their stated WTP on a five-point graded scale (see, e.g., [56]). Background questions included age, gender, education, and disposable income before tax. The questionnaire was distributed in Swedish to all households in Augustenborg, $n = 1887$.

3.2.2. Statistical Model

To analyze the question about the residential area in which the respondent would prefer to live, we estimated a univariate logit model in which the dependent variable takes the value one if the respondent has chosen to live in the area with visible BGS (Area 2), and zero otherwise. We used a general-to-specific method [57] to specify the statistical model, such that we started with a larger set of explanatory variables and then removed statistically insignificant variables from the model. The explanatory variables that we included in the model are some elements of socio-spatial dimensions such as proximity, number of floors, length of residence in Augustenborg, average amount of time spent outdoors daily, flooding-purpose knowledge, and recreational use affordances (in form of coming-and-going activities and stationary activities). We also controlled for age, gender, education, and income.

We used an ordered logit model to analyze the WTP data from the payment cards, in which the alternatives have a natural order. The advantage of applying an ordered probability model is that the model accounts for the natural order of the alternatives in the estimation of the probabilities (see, e.g., [58]). The ordered logit model was built around the following regression model:

$$Y_i^* = \beta' x_i + \varepsilon_i, \quad i = 1 \ldots, n \tag{1}$$

where Y_i^* is the underlying maximum WTP for individual i, the vector x_i is a set of explanatory variables, β is a vector of parameters, and ε_i is a residual with $\mathrm{E}[\varepsilon_i] = 0$ and $\mathrm{Var}[\varepsilon_i] = 3.29$. From the survey, we cannot observe Y_i^*, but we know which of the K categories that Y_i^* belongs to. It belongs to kth category if

$$\begin{aligned} &Y_i = 0 \text{ if } Y_i^* \leq \mu_0, \\ &Y_i = 1 \text{ if } \mu_0 < Y_i^* \leq \mu_1, \\ &Y_i = 2 \text{ if } \mu_1 < Y_i^* \leq \mu_2, \\ &\ldots \\ &Y_i = K \text{ if } Y_i^* > \mu_{K-1}, \end{aligned} \tag{2}$$

where the μ are threshold parameters that will be estimated together with β, and K is the number of categories. The ordered logit models were estimated with a maximum likelihood (ML) estimator [59] in SPSS 26.

We also applied the general-to-specific model approach for the specification of the ordered logit model. The explanatory variables that were included in the ordered logit model from the start were the same variables as those used in the univariate logit model from the start. For inference purposes, we focus on the estimated coefficients in Equation (1). The patterns of the statistical significance for the marginal effects will usually echo the estimated coefficients in Equation (1) [58]. These authors also have a preference, on a methodological basis, for inference on the estimated coefficients and not on the marginal effects; we also share this view.

4. Results

Of the total sample of households (1887) that received the questionnaire, 328 answered the survey. Of these, 57% were female, 40% male, and 3% other/unknown gender. The mean age of the sample was 53 years, range 18–95 years. Summary statistics for the variables that are used in the regression models are shown in Table 2. Compared to population statistics from Statistic Sweden [43], our sample has a slight overrepresentation of females and individuals with a higher education (see note under Table 2). After some site visits, we excluded coming-and-going activities from our analyses because of the high intensity of commuting in the area regardless of the presence of BGS.

In percentage, 20% have a primary school education, 38% a secondary education, and 42% a university education. The corresponding numbers from Statistic Sweden's population statistics for Augustenborg are 27%, 41%, and 31% [43].

A univariate probit model is developed to understand which factors influence people's preferences for living in a neighborhood with BGS in the future. Table 3 shows the results of the model. The variable takes the value 1 if the respondent has chosen to live in a neighborhood with BGS and zero otherwise. From the 289 respondents who answered the neighborhood preference question, 72% chose a neighborhood with BGS, and 28% preferred a neighborhood with underground pipe facilities. To identify the variables that influence the preference of neighborhood, we started with a general model specification that included the variables listed in Table 2. From this model specification, we removed the least significant variable one at a time. Variables for which the point estimate had a p-value above 0.10 were removed from the model.

Table 2. Descriptive statistics of the studied sample.

	N	Minimum	Maximum	Mean	Std. Deviation
Physical proximity	327	1	5	4.54	0.967
Coming-and-going activities	325	1	5	4.55	0.847
Stationary activities	319	1	5	3.23	1.382
Length of residence (in Augustenborg)	320	1	5	4.06	1.276
Flooding-purpose knowledge	295	1	5	4.07	1.109
Neighborhood preference	289	0.00	1.00	0.72	0.448
WTP for neighborhood with BGS	140	1	12	3.55	3.226
Living floor	313	1	5	3.12	1.050
Average time spent outdoors daily, winter (October–March) (Monday–Friday)	313	1	4	1.89	0.905
Average time spent outdoors daily, winter (October–March) (Saturday–Sunday)	288	1	4	2.08	0.978
Average time spent outdoors daily, summer (April–September) (Monday–Friday)	305	1	4	2.61	1.034
Average time spent outdoors daily, summer (April–September) (Saturday–Sunday)	289	1	4	2.76	1.046
Year of birth	261	1923	2000	1964.77	18.551
Education [b]	308	1	4	2.49	1.078
Income [a]	270	1	7	2.7	1.399
Gender (female)	328	0.00	1.00	0.567	0.496
Gender (other than male and female)	328	0.00	1.00	0.027	0.164
Suggesting larger water surface	292	1	5	3.04	1.218

Note: [a] Income is defined as monthly income before tax (including labor income, unemployment benefit, pension, parental benefit, housing allowance, and child allowance transfers. The income levels 1 to 7 correspond to the income intervals 1: <10,000 SEK/month, 2: 10,000–19,999 SEK/month, 3: 20,000–29,999 SEK/month, 4: 30,000–39,999 SEK/month, 5: 40,000–59,999 SEK/month, 6: 60,000–79,999 SEK/month, 7: >80,000 SEK/month. SEK 100 = € 9.82 (1 March 2021). [b] The four levels of education are 1: Primary school 9 years or less, 2: Secondary education, 3: University education <3 years, 4: university education >3 years.

Table 3. Result of the univariate probit model in which the dependent variable is the neighborhood preference from the photomontage question about living with or without BGS.

	B	S.E.	*p*-Value	Exp (B)
Physical proximity	0.438	0.153	0.004	1.549
Stationary activities	−0.246	0.114	0.030	0.782
Dummy variable, no reported income	−0.287	0.504	0.569	0.750
Income	0.253	0.140	0.071	1.288
Length of residence (in Augustenborg)	−0.264	0.133	0.047	0.768
Constant	0.444	0.937	0.636	1.559
Cox and Snell R-square 0.102				

The result from the final model suggests that proximity, stationary activities, length of residence in the neighborhood, and income influence preference and choice of a neighborhood with BGS. At a five percent significance level, we see that respondents who prefer to live in an area with BGS are currently living closer to BGS. Interestingly, the model also shows that people who prefer a neighborhood with BGS engage in fewer stationary activities around the BGS in Augustenborg. In addition, those who did not choose to live in an area with BGS in the future have been living in Augustenborg longer. At a ten percent significance level, the results reveal that those who have chosen a neighborhood with BGS have a higher income than those who preferred living in a neighborhood without BGS.

In total, 125 respondents answered the WTP question for neighborhood with BGS (respondents who gave protest answers against the payment vehicle were removed from the sample). Table 4 shows the frequency table for the WTP for living in an area with BGS. A smaller fraction of the respondents stated a WTP of zero (49 percent), in contrast to respondents who chose to live in the area with pipes, for which 71 percent state a WTP of zero (data not presented).

Table 4. Frequency table for willingness to pay for living in a neighborhood with BGS.

		N	Marginal Percentage
WTP for future neighborhood with BGS	0 SEK/month	61	48.8%
	10 SEK/month	6	4.8%
	25 SEK/month	2	1.6%
	50 SEK/month	14	11.2%
	75 SEK/month	2	1.6%
	100 SEK/month	10	8.0%
	150 SEK/month	4	3.2%
	200 SEK/month	16	12.8%
	250 SEK/month	1	0.8%
	300 SEK/month	5	4.0%
	400 SEK/month	1	0.8%
	More than 400 SEK/month	3	2.4%
Total		125	100.0%

To understand which factors influence WTP for BGS, the same general-to-specific modelling approach as for the univariate logit model was used for the specification of the ordered logit model (Table 5). The final specification for the ordered logit model shows that people's flooding-purpose knowledge, stationary activities, length of residence in Augustenborg, the floor they live on, and their gender are factors that influence their WTP for BGS. In addition, the results reveal that individuals with a higher income have a higher WTP. All point estimates are significant at a five percent significance level, except the point estimate for the variable length of residence in Augustenborg, which is significant at a ten percent significance level. The regression results indicate that the longer respondents have lived in Augustenborg, the less they cared to pay for BGS. In addition, women have a lower WTP than men (the reference gender in the regression model). People living on a higher floor also have a lower valuation (WTP) for the BGS. Furthermore and interestingly, the results reveal that the coefficient "suggesting for larger water surfaces" is statistically significant (p-value 0.02). More specifically, those who agree to a larger degree with the statement that future blue-green areas such as Augustenborg should be provided with larger water surfaces also have a higher WTP for BGS.

A total of 319 respondents answered the item related to doing stationary recreational activities around at least one of the BGS. A five-point Likert scale was also used for this item. The variable takes the value one if respondents never go to BGS to engage in stationary activities, and five if they engage in activities every day. To analyze which factors influence stationary activities around BGS, we estimate an ordered logit model with the same general-to-specific approach as before. The dependent variable in the model is "doing stationary activities at least around one of the BGS".

The estimation results in Table 6 show that factors that influence the frequency of doing stationary activities are physical proximity, the average daily time people spend outdoors at weekends in summer, and income. All points are significant at a five percent significance level. Of these variables, proximity and the average daily time spent outdoors at weekends in summer have a positive impact on doing stationary activities. This means that the closer people live to BGS, the more they engage in stationary activities around them. In addition, the more time people spend daily in Augustenborg's outdoor environment at weekends in summer, the more stationary activities they engage in around BGS. However, the income variable has a negative impact on doing stationary activities. This indicates that individuals with lower income tend to be locally involved in stationary activities around the BGS to a greater degree than individuals with a higher income. This result also highlights the importance of adding an analysis of the use of the BGS for different groups of individuals. The lower WTP for BGS of lower income groups may thus indicate that their budget constraint limits their WTP for BGS, because the use value in terms of stationary activities tends to be larger for lower income groups than for higher income groups.

Table 5. The parameter estimates of the ordered logit model for WTP for living in a neighborhood with BGS.

		Estimate	Std. Error	*p*-Value
Location	Stationary activities	0.280	0.135	0.039
	Dummy variable, no reported income	−0.152	0.822	0.854
	Income	0.436	0.148	0.003
	Flooding-purpose knowledge	0.484	0.173	0.005
	Gender (female)	−0.759	0.380	0.046
	Gender (other than male and female)	−1.608	1.165	0.168
	Living floor	−0.531	0.196	0.007
	Length of residence (in Augustenborg)	−0.236	0.142	0.097
	Suggesting larger water surface	0.374	0.158	0.018
Threshold parameter	1	1.880	1.278	0.141
	2	2.108	1.281	0.100
	3	2.186	1.282	0.088
	4	2.768	1.291	0.032
	5	2.857	1.293	0.027
	6	3.355	1.302	0.010
	7	3.594	1.307	0.006
	8	4.902	1.346	0.000
	9	5.028	1.352	0.000
	10	5.971	1.409	0.000
	11	6.307	1.442	0.000
	Cox and Snell R-square 0.249			

Note: The estimated threshold parameters (see Equation (2)), μ_k, k = 1, … ,12, define the cut point on the latent variable for the 12 different intervals on the payment card

To test for possible multicollinearity between the explanatory variables in the estimated models, the variance inflation factor (VIF) was calculated. The results show that the VIF's are below 1.71, which indicates a moderate correlation between the variables and that multicollinearity is not a problem in the estimated models.

Table 6. Results of the ordered logit model in which the dependent variable is public life use in the form of stationary activities.

		Estimate	Std. Error	*p*-Value
Location	Physical Proximity	0.239	0.116	0.039
	Average daily time spent outdoors, summer (Apr-Sept) (Sat-Sun)	0.541	0.107	0.000
	Income	−0.343	0.085	0.000
	Dummy variable, no reported income	−1.362	0.379	0.000
Threshold parameter	1	−0.268	0.625	0.668
	2	0.803	0.625	0.198
	3	1.728	0.631	0.006
	4	3.068	0.647	0.000
	Cox and Snell R-square 0.166			

Note: The estimated threshold parameters (see Equation (2)) define the cut point on the latent variable for the five options on the Likert scale that measure stationary activities, from 1 = Never to 5 = Every day. The results are not affected if we add time spent outside or not; i.e., the other two variables are significant independently of whether the variable time spent outside is included in the model or not.

5. Discussion

In this study, we have presented how people care differently for different aspects of their environment, which in turn also underlines the need for different ways of measuring people's perceptions and preferences of it. First, we looked at how residents use the BGS and its urban design. The respondents who lived closer to the BGS, spent more time outdoors at weekends in summer, and had a lower income also used the blue-green areas more for stationary recreational activities. Similarly, earlier studies also confirmed that inhabitants often recognize the urban green space as a key element in their neighborhood and as something that enhances their quality of life. The intensity of use can here be connected to their socio-economic status, and it increases in lower-income neighborhoods (i.e., [60]). People with lower income use the area for recreational purposes more frequently. This might be due to various reasons, such as not being able to afford travel elsewhere or to use private gardens for recreational purposes [61].

Second, we looked at the question of whether people preferred to live in an area with BGS in the future or not. It turned out that people with higher incomes, people who lived closer to the BGS, and people who did not tend to be much involved in stationary activities also tended to prefer moving to a neighborhood with BGS in the future. People who had lived for a long time in Augustenborg tended not to choose an area with BGS in the future.

Third, we looked at WTP. People who were more involved in stationary activities and who knew about the flood mitigation effects of the BGS, i.e., who had developed a certain cognition around the BGS, were more willing to pay. Furthermore, the more people agreed with the statement that future BGS environments, similar to Augustenborg, should be provided with larger water surfaces, the stronger the WTP. Aspects that made people less willing to pay included gender (women were less willing to pay), living on higher floors in the buildings, and a longer time of residence in Augustenborg. The longer time probably brings a broader cognitive and experiential knowledge also about the negative aspects of functional affordances, or it allows one to "settle down" and take the BGS for granted. Being aware of the potential benefits of BGS might have led to a better acceptance by the residents, albeit sometimes not strong enough for them to justify increasing property values [62]. Similarly, in a study in the Netherlands, people preferred diverse and attractive adaptive green measures, but this did not affect their WTP—only their level of income had an effect on the WTP [25]. People with higher income were more willing to pay, which is a common finding in WTP studies, because they can afford to spend more money on goods and services. Wang, Sun, and Song [63] have also shown that income is one of the main factors influencing inhabitants' WTP supporting BGS in China. Income is thus an important control variable to include in the regression models.

To conclude, we might argue that the building of cognition and experience seem to influence inhabitants' evaluation of BGS and the different ways in which they care for their environment. For example, caring to use something is a positive response, but use was also related to a tendency not to prefer BGS when moving in the future, which means that it can also be related to a more negative or dissenting evaluation of the environment. To take measure of one's environment by engaging in stationary recreational activities might thus result in both an affirmative and a dissenting evaluation at the same time (as in, "yes, I like to use it, but given the opportunity I would prefer another environment"). We saw a similar trend with respect to WTP, in that experience and understanding might both increase (through engaging in stationary activities) and decrease (through longer residence at the place) the WTP for BGS. This is also why we argue that a measure–value relation needs to be seen as an environment and not as a simple correlation. Whatever is important in one situation will be unimportant in another situation, i.e., as landscapes of care develop, one tends to care differently about BGS in different circumstances. The temporal aspect is of importance here. An environment might afford something; however, affordances are relational and constantly in a state of change. They are formed not only through relations between different human and non-human actors but also through the relations and tensions between the different facets of everyday life. Affordances and matters of care evolve both over time, i.e., the longer people have lived in the neighborhood and the more they have used the area around BGS, the more the BGS seems to be understood as not affording a desirable living environment. This needs to be explored more to understand why such perceptions and conceptions emerge, but one reason might be the increase in practical knowledge and know-how. As knowledge evolves around certain material conditions, both affirmative and dissenting practices and evaluations might develop in parallel.

Our study showed that people related differently to BGS in their everyday lives. What they care for, and how much they care seems to change over time. Not only did they develop different criteria to evaluate generated values around BGS, but sometimes, depending on the type of the value they assessed, they could apply the same criteria differently. These patterns of care (and how they interrelate with the production and reproduction of preferences) seem to be of importance to study but need in-depth qualitative studies to develop further.

6. Conclusions

In this article, we used the notion of care in order to study the production and reproduction of different perceptions and preferences related to BGS. In the study, we have seen if and how people relate to BGS when it comes to the issues use, living with BGS in the future, and paying for BGS. We have also shown that how to care for BGS is a complex question in which care can be formed and transformed over time and in which caring and not caring about the BGS environment at times can even go hand in hand. The building of cognition seems to influence inhabitants' evaluation of BGS and the different ways in which they care for their environment. People's interests as well as their conditions vary in time and their perceptions and preferences shape dissimilarly around BGS. This also means that we can never be satisfied with evaluating just one value or preference. Instead, we need to start mapping a measure–value environment if we want to understand the complex and entangled ways in which people form patterns of care for their environment. New matters of concern and care develop over time, inducing processes of both de- and reevaluation. When living and experiencing BGS on a daily basis, people's landscape of care thus changes through their experiences. However, how we care about something can differ depending on the situation. People do not really synthesize care into one coherent picture, but they allow themselves to have incoherencies in their view depending on what they evaluate.

The results of this article indicate that the focus on how to design and plan for BGS should be more than just achieving hydrologic and hydraulic functionality in flooding occasions. It needs to be shifted towards how the infrastructure can or cannot be applied and accepted in everyday life. Furthermore, we have argued that in order to understand the different (and seemingly contradictory) perceptions and preferences involved in the on-goings of everyday life, we need to acknowledge that we are dealing with a landscape of different matters of care that are constantly being formed. Although knowledge about how the flood mitigation functions of the BGS might make people more positive, practical knowledge about and experience of the use of BGS seemed to have the opposite effect in our case. What an environment offers us influences our experiences and, hence, perceptions, which in turn affects everyday life preferences. It is thus not a given that everyone cares for these solutions; instead, it depends on a series of parameters and circumstances, some of which have been addressed in this paper.

Experience and practice are ongoing processes that continually test our understanding of an environment and transforms its meanings. Values are dynamic and transform over time, and in order to understand how people evaluate and care for their environments, we need to map the different ways in which they can and do take measure of the environment. This also has bearings on planning and design. In order to improve BGS, we need, for example, to understand that well-used BGS environments are not per se successful ones, nor does constant use of a BGS environment mean that people will choose an area with BGS in the future. Furthermore, learning about BGS seems to increase the willingness to pay for it, whereas caring to use it seems to decrease the willingness to pay for it. Planning and design might thus want to look deeper into the useability and pedagogical aspects of BGS if they want people to pay for BGS and to choose it in the long run. To help the planning and design of long-lived and socially resilient BGS, we also argue that research needs to engage more in the complex matters of care and concern that are produced in and through everyday life. Planning, on the other hand, needs to go from a phase in which the focus is mostly on implementation and production into a phase in which issues of maintenance and reproduction are given more attention.

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