Peter Schantz

Exploring environmental unwellbeing – wellbeing in landscapes

Introduction

When invited to contribute to this journal, I reminded myself of a quote from Torsten Hägerstrand, the human geographer and father of time geography (1991, p. 66): "… throughout nature, a purposeful behavior is achieved through a mechanism known as feedback, which continuously reports to the governing body, how the measures taken have turned out in relation to the intended purpose. That is not the case within the planning system."

His text is based on a lecture for physical planners in the year of 1961. Sadly, the problem persists in our times, which brings me to the topic of this text: a background, a scale for measuring environmental unwellbeing–wellbeing, and its use in appraisals of three green settings.

Wellbeing is part of the WHO health definition: "Health is a state of complete physical, mental, and social wellbeing and not merely the absence of disease or infirmity" (WHO, 1948). It is thereby reasonable that wellbeing fulfils the needs of a variable that can integrate a wide array of aspects. However, in order to do so, it demands that even the negative opposite of wellbeing can be expressed semantically and rated. To my knowledge, there has been a paucity of such efforts. Given that, the term "unwellbeing" (in Swedish: ovälbefinnande) has been established (Schantz, 2014). It enables, e.g., measuring "external environmentally induced forms of unwellbeing–wellbeing", which can be named as: "environmental unwellbeing–wellbeing".

This variable has a potential value in education, research, and societal evaluations. It can, for example, be of value for understanding if, and how, it may affect other features in man, e.g., all three aspects that WHO connects to the wellbeing of humans: "physical, mental, and social wellbeing". It is not the aim here to cover these fields, but to provide some examples from stress research and environmental psychology.

Since the 1980s, concordant findings from both North American and European research indicate that most green settings, compared to urban environments without green elements, have the following effects (cf. Ulrich, 1984):

- elicit positive emotions
- reduce fear in stressed individuals
- block or reduce stressful thoughts
- foster restoration from anxiety or stress
- sustain interest and attention

Another example is noise, which is well known to cause both medical health problems (WHO, 2019) and negative effects on wellbeing (Basner & McGuire, 2018). But in many other ways, the relationships between internal and external influences

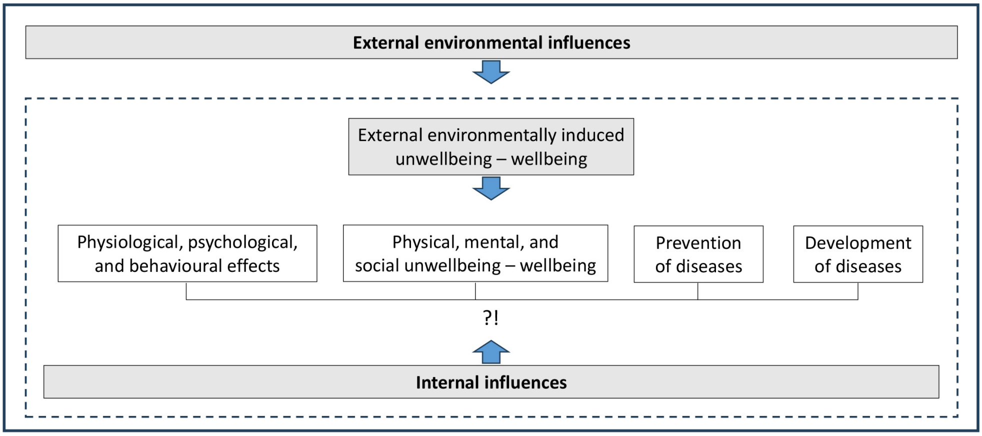

Figure 1. Schematic model of various sources of potential influences on different outcomes. In this text, the focus on external environmental sources inducing environmental unwellbeing–wellbeing is primarily on green settings in landscapes. Question and exclamation marks indicate existing or conceivable interactions between the four aspects in the middle of the model. Internal influences encompass a broad array of factors, including genes, risk factors, interests, and a sense of coherence.

on several outcomes, including various forms of unwellbeing–wellbeing, other psychological, physiological, and behavioral effects, as well as the prevention or development of diseases, have not yet been explored (Figure 1).

Developing a scale

Previous studies on how environmental factors along routes relate to the willingness to cycle to work (cf. Wahlgren et al., 2010; Wahlgren & Schantz, 2011) prompted the use of bipolar scales with adjectival opposites. For example, we used endpoints of "inhibit *vs* stimulate" for the outcome variable, and "ugly *vs* beautiful" for the predictor variable "aesthetics" (Figure 2).

The challenge in creating a scale for educational purposes was to make it self-explanatory and easy to use. Therefore, both minus and plus values were used, and a zero represented a neutral position (Figure 3).

One uncertainty was whether the term "environmental unwellbeing" would feel awkward to use, as it was novel. Would it, in such a case, lead to the whole scale, or part of it, not being used? Another question was how the endpoints of the scale should be labelled. After visiting the areas intended for the study, the selected levels of adjectival expressions were deemed sufficient to cover the required measurement range. The number of steps was then determined to hopefully accommodate various individuals' needs. Thereafter, the scale was tested.

A challenge in measuring external environmentally induced unwellbeing–wellbe-

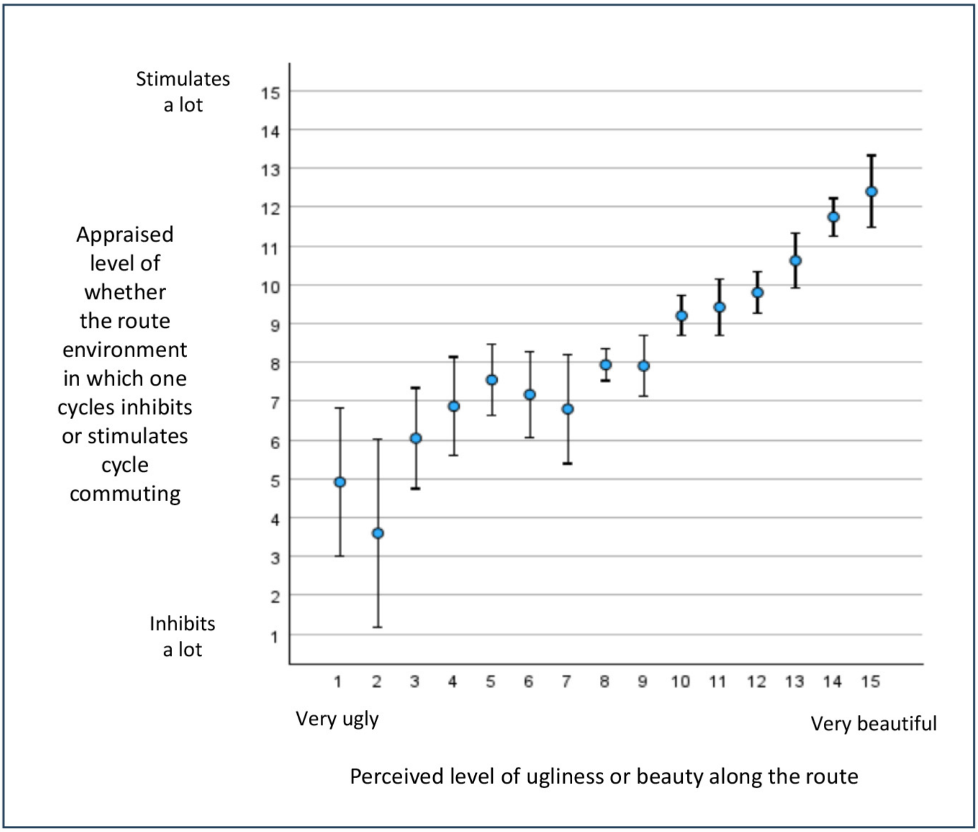

Figure 2. Example of two bipolar 15-point scales with verbal anchors at the endpoints. Number 8 represented a neutral position of "neither nor" between the endpoints, e.g., "neither ugly nor beautiful". The results are illustrated with mean values and 95% confidence intervals (n = 827), and are based on data from Wahlgren & Schantz (2012).

ing in landscapes is that the overall wellbeing dimension has both internal and external sources. Thus, in measurements of environmental unwellbeing–wellbeing in, e.g., landscapes, one needs to instruct individuals to base their ratings solely on the outcomes of the specific source in focus, and to use, or imagine, a condition in which the influence of the internal or other external sources of unwellbeing–wellbeing, respectively, is neutral or consciously perceived as neutral.

Mapping environmental unwellbeing–wellbeing in a landscape

Here follow experiences from two pilot studies of appraising three green settings within a peri-urban park landscape.

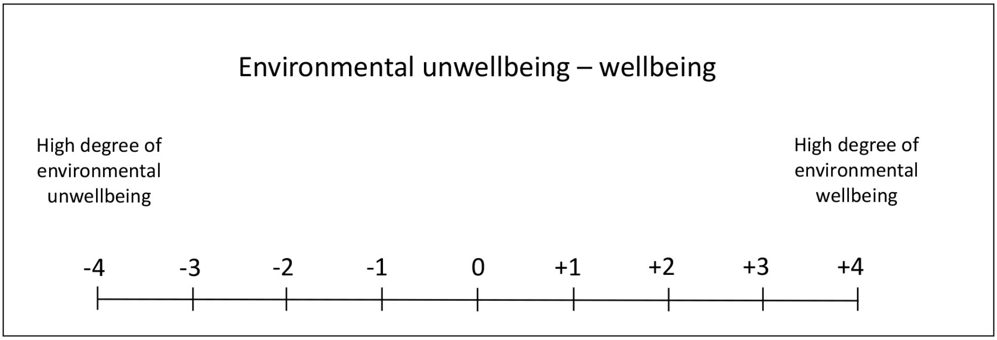

Figure 3. A 9-point scale for appraisals of environmental unwellbeing–wellbeing. Negative values indicate environmental unwellbeing, and positive values indicate environmental wellbeing. The figure 0 stands a neutral point of "neither environmental unwellbeing nor wellbeing".

Measurement 1: Explorative appraisals at Haga, Annelund, and Ulriksdal

The first pilot study, titled "The Haga–Annelund–Ulriksdal Study", was conducted in a pedagogical context at three places north of Stockholm, the capital of Sweden (Figure 4). For that purpose, it was essential to include varied settings that, altogether, could be expected to yield both wide and varied rating distributions. Thereby, the ratings could lend the scale a greater apparent validity and indicate whether its width was appropriate.

An important factor in selecting Annelund was its proximity to a source of noise, i.e., the national highway Uppsalavägen (E4). Vehicle flows could also be observed from some points within the circled study area (Figure 4). Furthermore, the appraised space also included parking lots. Therefore, ratings of this area were expected to yield fewer positive and more negative values than those of the other two places, which represent more uniform green areas farther from the national highway.

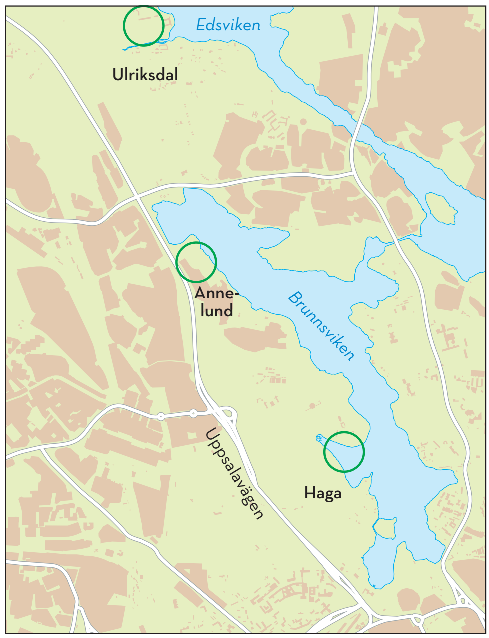

Figure 4. The circled areas at Haga, Annelund, and Ulriksdal were appraised for environmental unwellbeing–wellbeing. They are situated in the municipality of Solna, adjacent to the inner urban area of Stockholm, Sweden. West of them is the national highway, Uppsalavägen (E4). The map has been published in Schantz (2017); reproduced with permission from the publisher.

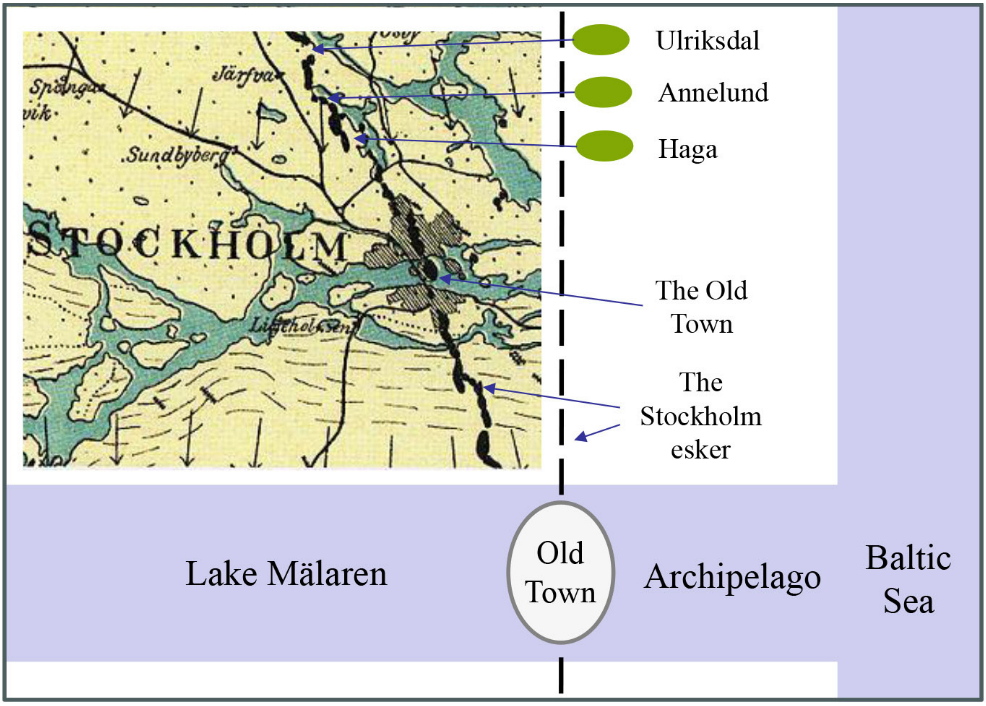

Figure 5. Schematic map of how the physical geography has formed conditions for the human geography of the Stockholm area, including the three studied park areas. The Stockholm esker map was published by the geologist Gerhard de Geer (1897).

The studied areas' geographical and historical background

A common denominator among the three settings studied is that they are aligned along the so-called Stockholm esker, which also served as the foundation for the historical core of Stockholm, i.e., an island that today is known as Gamla stan (in English: the Old Town). The distances from that island to the mainland, in both the north and the south, enabled bridges to be built. As a result, important possibilities for landbound movements along a south-north axis could be controlled. This is due to the great and wide water masses both east of that island (the archipelago and the sea) and west of it (Lake Mälaren) (Figure 5). Thereby, the island's geographic location also enabled control over water-based movements. Entering the city also required paying tolls. At this, from a defence point of view strategically and economically favourable location, the capital of Sweden, and home to the king and queen, was established. This also explains the location and evolution of the three historic park areas surveyed in this study. All of them are neighbouring large bodies of water within a rift valley landscape. The parks' historic lines will be further illuminated below.

Although there are common factors across the three studied park settings, their character differences are substantial (Figure 6). Ulriksdal, at the top, is a baroque park that represents a view of nature that emerged when land use created a division between cultivated and wild areas, dating back approximately 10,000 years. Later, this evolved into a symmetric park ideal, fully controlled by man.

In the middle, the 1817 map shows the area of Annelund east of the road. A park was established there after 1822. Its evolution respected the area's existing topographical features.

Haga, at the bottom, represents a setting formed during the 1780s as an English landscape garden, thereby unveiling a more modern view of nature which emerged during the latter half of the 18th century. Integrated into its plan is the appreciation of wild nature, which was in a conscious dialogue with the formed areas of the park. Thereby, the formation of Haga aligned with the foundation of contemporary outdoor life with its attraction to wild nature (Johannisson 1984).

The choice of Annelund as a study object was also related to the fact that Per Henrik Ling (1776–1839), the gymnasiarch and founder of the Royal Gymnastic Central Institute (GCI) as well as of Ling gymnastics, lived there from 1822 to 1839. It was he who created a park there, and both his mansion and the outdoor grave that he established still remain (Schantz, 2002). An additional reason for selecting Annelund as a study place was that Ling founded the university college where the participants in the first pilot study studied (Gymnastik- och idrottshögskolan) (see below).

Measurement 1: Participants and measurements

61 teacher candidates in physical education and health (47.5% women) visited the three different green settings in September 2012. They rated their individually experienced environmental unwellbeing–wellbeing on a 9-point scale (Figure 3) and shared the data afterward. They also motivated their ratings.

Haga was viewed from the water, sitting in a kayak. The other two places were viewed while being on the ground in those areas. Haga and Annelund were visited by each student on the same day, whereas Ulriksdal was visited on a different day. Different days within a week were used for different groups of students. This means that day-to-day weather variations may have affected the ratings.

Results from measurement 1: Appraisals at Haga, Annelund and Ulriksdal

The results of the assessments are shown as individual values in Figure 7, and summarized in Table 1.

There were no gender differences in the ratings at any of the settings. At

Figure 6. Historic maps of the three appraised landscape settings, from top to bottom: Ulriksdal, Annelund, and Haga. Ulriksdal is a typical baroque park dating back to the 1630s, initiated by the field marshal Count Jacob De la Gardie and designed by Hans Jacob Kristler. The map was created by Lars R. Kökeritz in 1775. Annelund, on the east side of the road, was established as a park by Per Henrik Ling after 1822, i.e., five years after the map by W.M. Carpelan was printed in 1817. At the bottom is the plan from 1781 by the landscape architect Fredrik Magnus Piper, for the creation of the English landscape park of Haga (Photograph: The Royal Academy of Fine Arts & Björn Strömfeldt). King Gustavus III was its very engaged initiator.

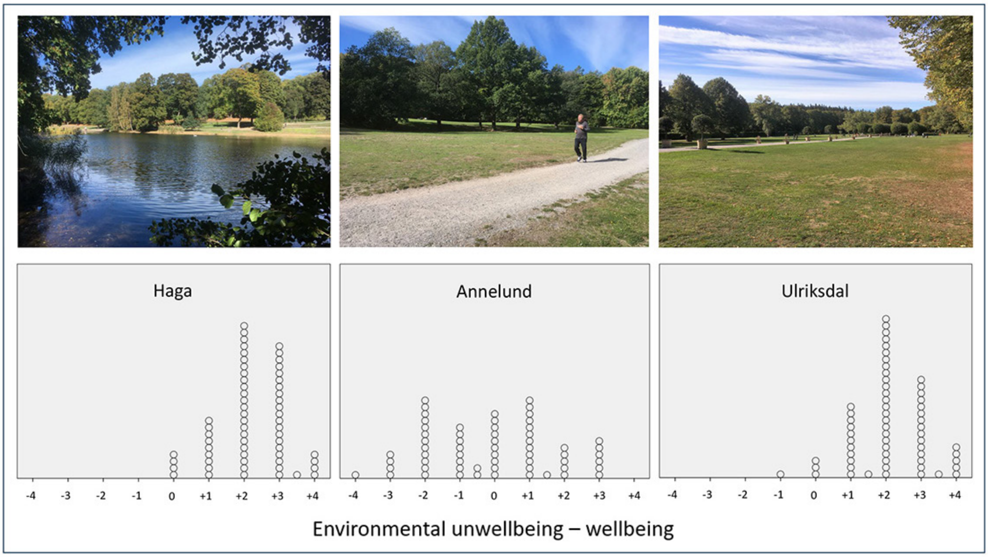

Figure 7. Individual ratings of environmental unwellbeing–wellbeing at Haga, Annelund, and Ulriksdal. For the scale used, see Figure 3, and for further explanations, see Table 1 and the text.

Haga and Ulriksdal, almost all assessments were within the environmental wellbeing part of the scale (+1 to +4), and did not differ statistically (Figure 7, Table 1). Overall, for both these environments, approximately 68% (i.e. two standard deviations) of the assessments were within the range of between about 1.1 to 3.2 (calculated from the measurements in Table 1). At Annelund, however, the values were significantly lower than both at Haga and Ulriksdal. The mean value was close to the neutral position, and the spread was numerically larger than in the other two environments. 48 percent of the assessments, i.e., those within –2 standard deviations of the mean, ranged from about –3.5 to –0.1. This means that approximately half of the

Table 1. Measurement 1: Ratings of environmental unwellbeing–wellbeing (n = 61) at Haga, Annelund, and Ulriksdal, as well as approximate distances to the national highway Uppsalavägen, (E4). The statistical evaluations were based on repeated paired comparisons using Student's t-test and a p-value of less than 0.025.

Ratings of environmental unwellbeing–wellbeing (n=61)	**Haga**	**Settings** **Annelund**	**Ulriksdal**
Mean value	2.20	–0.12*	2.10
Standard deviation	1.01	1.81	1.07
Range	0 – 4	–4 – 3	–1 – 4
95% confidence interval	1.95 – 2.46	–0.59 – 0.34	1.82 – 2.37
Distance (m) to highway	~610	~50 – 200	~740

Note: * = Significantly lower values in Annelund compared with both Haga and Ulriksdal.

Figure 8. Arrows indicate the positions from which the participants appraised the environmental unwellbeing–wellbeing in Haga (see map to the left), as well as at the first position at Annelund, close to the lake (see position 1 on the map to the right), and a position closer to the national highway (position 2). The maps are sourced from the National Land Survey of Sweden's (Lantmäteriet) application, "My map" as of December 2025. They have 35% terrain shading. Translations and explanations: Koppartälten = The Copper Tents; Slottsruin = Castle ruins; Lings grav = The Grave of Per Henrik Ling.

students experienced varying degrees of environmental unwellbeing at Annelund. That raised the question of whether the span in values was inherent to different individuals appraising the same setting, or due to varying positions within the circle when viewed and appraised.

Measurement 2: Appraisals at Haga and Annelund under controlled conditions

The above-presented appraisals were, as stated, based on viewing an intended 360-degree view from within each rather wide circle. Thus, it was not possible to pinpoint whether environmental and/or individual factors underpinned the large spread in ratings at Annelund (Figure 7). Therefore, in the Haga-Annelund study, it was desirable to gain a better understanding of the ratings through distinct views and to perform the appraisals simultaneously under the same environmental conditions for different individuals. That measurement strategy was applied during the author's open-air lecture to the general public on a weekend (March 30, 2019). The participants were then asked whether they would like to assist in assessing three places in the landscape that we would walk through anyway (see Figure 8). As shown in Figures 9–12, the appraisals were conducted under conditions with no leaves on the trees.

Results from measurement 2: Appraisals at Haga and Annelund

As in measurement 1, no gender differences were observed in the ratings across any of the settings. High positive ratings of environmental unwellbeing–wellbeing were noted in Haga by the pelouse (Table 2), thereby reproducing the appraisals at Haga in measurement 1 (Table 1). Further-

Figure 9. Rated view at Haga, by the so-called pelouse (Photograph: Peter Schantz).

Figure 10. Rated view at Annelund by the lake (cf. position 1 in Figure 8) (Photograph: Peter Schantz).

Figure 11. Rated view at Annelund closer to the highway (cf. position 2 in Figure 8). The noise levels at this position were about 65 dB, whereas in position 1 (Figure 10), they were about 54 dB. When the students rated the Annelund area in 2012, the lower part of the parking lot to the right in the image did not exist. That area was then a green area with a great number of trees of varying sizes (Photograph: Peter Schantz).

Figure 12. The raters at Annelund by the lake (cf. position 1 in Figure 8) (Photograph: Peter Schantz).

Table 2. Measurement 2: Ratings of environmental unwellbeing–wellbeing (n = 11) at Haga and at two positions at Annelund (position 1 = by the lake, and position 2 closer to the national highway), as well as approximate distances to the national highway Uppsalavägen, (E4). The eleven participants, comprising seven women and four men, had a mean age of 67.1 ± 9.7 years, based on data from ten participants. The statistical evaluations were based on repeated paired comparisons using Student's t-test, and a p-value of less than 0.025.

Ratings of environmental unwellbeing–wellbeing (n=11)	Settings		
	Haga	Annelund 1	Annelund 2
Mean value	3.09*	1.05**	−1.59
Standard deviation	0.70	1.71	1.71
Range	2 – 4	−2 – 3	−4 – 1.5
95% confidence interval	2.62 – 3.56	−0.10 – 2.19	−2.74 – −0.44
Distance (m) to highway	~ 630	~200	~110

Notes: * = Significantly higher values at Haga compared with both position 1 and 2, respectively, at Annelund.
** = Significantly higher values for position Annelund 1 by the lake, compared with position Annelund 2 closer to the highway.

more, the measurements at the two different Annelund positions showed distinct and significant differences. That facilitated the interpretation of the large variation in students' ratings of environmental unwellbeing–wellbeing at Annelund (Figure 7). In addition, it showed that the scale is sensitive to variations in the external environment.

Comparison of measurement 1 and 2 of Haga and Annelund

There was a concordance between the two measurements at Haga and Annelund. This is illustrated in Figure 13, which is based on data from Tables 1 and 2.

The mean values and the 95% confidence intervals for the ratings are shown in Figure 13. These intervals represent the range of values within which the true population mean is estimated to lie with 95% confidence. With more participants or less diversity in rated values, the range for these confidence intervals decreases. That explains why the 61 ratings in measurement 1 yield much narrower confidence intervals than those for the 11 ratings in measurement 2.

At both measurement occasions, the differences in the ratings between Haga and Annelund were significant ($p < 0.025$). At measurement 2, even the two ratings within Annelund differed significantly (Table 1).

Concluding remarks

This contribution commenced by illuminating the human geographer Torsten Hägerstrand's (1991) view that a major drawback is that the planning sector does not evaluate outcomes of its measures. Without that kind of feedback, there will be no learning processes, and thereby that sector will not contribute to an empirically based enhancement in environmental wellbeing for individuals, groups, and societies, which should reasonably be an important goal.

Thereafter, reasons for using the variable environmental unwellbeing–wellbeing in this and other contexts were stated, and a scale for educative and evaluative purposes was presented. When using it in three different green areas, two were rated as providers of environmental wellbeing,

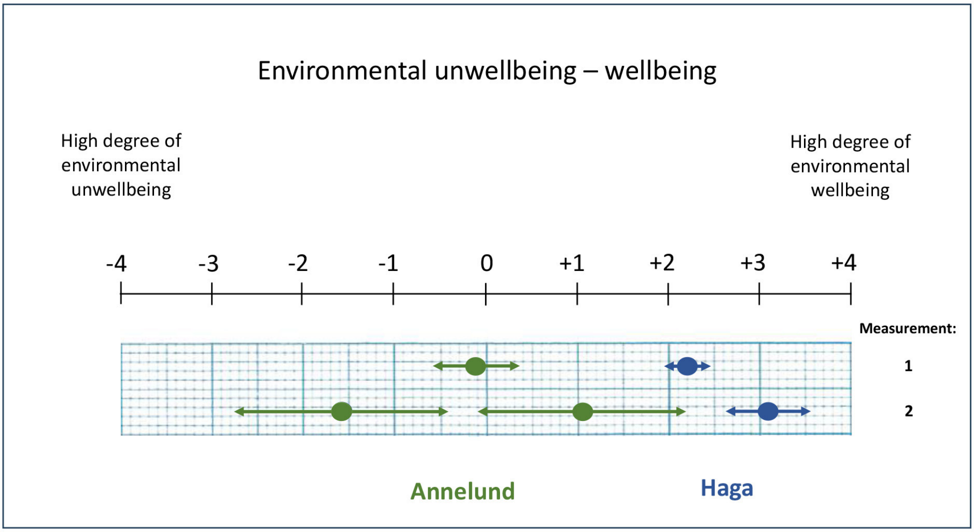

Figure 13. Means and 95% confidence intervals for appraisals by two independent groups of raters based on Tables 1 and 2. Measurement 1 was performed by students (n = 61), and measurement 2 by adult participants at an open-air lecture (n = 11). Mean values are shown as blue dots for Haga, and in green for Annelund. 95% confidence intervals are marked with bidirectional arrows in corresponding colours. Appraisal positions 2 and 1 at Annelund in measurement 2 (cf. Figure 8) are illustrated in green to the left and to the right, respectively.

whereas in the third, half of the ratings indicated a more or less pronounced induction of environmental unwellbeing. To my knowledge, these are the first ratings of this kind.

Although this presentation focuses primarily on green areas, other aspects of the physical and traffic landscapes, at all scales, character, and density of built-up settings, are equally important to evaluate and understand from these perspectives. This is, indeed, a prerequisite in order to, in a knowledge-based and systematic fashion, further the understanding of what causes environmental unwellbeing–wellbeing in broader contexts, and to act on the basis of that.

Here follow comments on two aspects of the present study: 1. Experiences using the scale, and 2. Comments on the findings.

Experiences using the scale

In pedagogical work, one often seeks tools that are easy to use and rather self-instructing. In all instances where this scale has been used, the present layout appears to meet those criteria. In support of it is also the fact that the full width of the scale was used, and there was no accumulation of ratings at either endpoint. This suggests that its breadth corresponded to relevant appraisals for these three settings. Also, within the two groups of participants, both negative and positive ratings occurred, and the findings were reproduced. This speaks in favor of the scale's usability and apparent face validity. However, it is also essential that they allow respondents to select a mark that is appropriately fine-tuned. In most cases, the students used the full points on the scale, but in others, they employed intermediate steps, such as "1.5" and "–0.5". This suggests allowing those half steps, marking them, and pointing out that possibility in the instructions. Finally, combining ratings with written explanations is a great way to better understand the causes for the ratings.

Further studies using the scale presented here are of value. Refinements in wording at the endpoints may be warranted depending on the settings to be appraised. For example, an endpoint of "a very high degree of environmental unwellbeing" can sometimes be relevant. Such issues can be sorted out depending on the intended study area. Likewise, intermediate semantic support can be valuable but quite demanding.

Comments on the findings

The measurements under controlled conditions provided very high ratings of environmental wellbeing by the pelouse in Haga. That sparks a curiosity about the qualities that can explain it. And how they could be expressed. I suggest the reader give it a try, looking at the view in Figure 9. If that qualitative assessment had been done in conjunction with the appraisals, would the responses have been rather uniform, or would quite different wordings have led to the high ratings? I think the reader can agree that, in a pedagogical context, these kinds of issues help foster reflection on how different spatial units and environmental conditions affect us. As a teacher, one might ask for a further introduction to these matters, and I would then suggest Grahn and Stigsdotter (2010).

As with the students, the ratings under controlled conditions at Annelund indicated environmental problems in some parts. To follow up on these kinds of findings is important. The outcome always depends on causative variables. To identify them, various methods can be used. In our first pilot study, the students' motives for their appraisals at Annelund indicated that both traffic noise and the visibility of vehicle flow on highways contributed to lower ratings.

This is consistent with studies of commuting cyclists, which show that both noise and motorized vehicle flow hinder cycling in suburban–rural areas of a metropolitan region (Wahlgren & Schantz, 2014). In other words, these two traffic variables have a repelling effect, i.e., an effect opposite to attraction. A consequence is that people may, if possible, avoid visiting such an area. That is, of course, particularly problematic in a green setting intended as a place for physical activity, to experience nature, engage in recreation, and rest. In this case, the three studied settings are parts within a national urban park, with the aim of not only being protected, but also to be strengthened in terms of its values, as stated in the governmental bill: "the development of the national urban park should aim at strengthening the area's natural, cultural and recreational values and protecting biodiversity" (Regeringens proposition 1994/95:3, p. 45). Since then, most of that area has also become a national interest for outdoor life (Swedish Environmental Protection Agency, 2017).

The National Transport Administration (Trafikverket) in Sweden currently has no management rule addressing the problems caused by motorized traffic in any green recreational area in the country. If Torsten Hägerstrand's early call to create a feedback system within the planning system had been heeded, that might not have been the case.

As I approach the last parts of this paper, I would also like to end it with a prospective outlook. First of all, if used in education, the scale can be a valuable tool for exploring different types of landscapes, raising awareness, and fostering reflections on how different spatial units and environmental conditions affect us and what this may be due to. It is reasonable that such an objective in education can be applied in different subjects in the public school system, not least geography, as well as physical education and health. Secondly, in a pedagogical use of the same scale, but in another environmental context (passive and active commuting route environments), the students reported that the ratings served as a valuable eye-opener. That, in my mind, provides a strong reason to use them across various pedagogical contexts. Hopefully, the simple examples presented here can spark interest in such a development.

Since these studies were undertaken, further experience in monitoring this variable across various environmental settings indicates its value in broader societal contexts. Hopefully, the scale will also soon be developed for research purposes and assist an emerging body of knowledge in this field.

Acknowledgements

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