



**University of
Zurich**^{UZH}

**Zurich Open Repository and
Archive**

University of Zurich
University Library
Strickhofstrasse 39
CH-8057 Zurich
www.zora.uzh.ch

Year: 2023

Characterising and mapping potential and experienced tranquillity: From a state of mind to a cultural ecosystem service

Purves, Ross S ; Wartmann, Flurina M

DOI: <https://doi.org/10.1111/gec3.12726>

Posted at the Zurich Open Repository and Archive, University of Zurich

ZORA URL: <https://doi.org/10.5167/uzh-255720>

Journal Article

Published Version



The following work is licensed under a Creative Commons: Attribution 4.0 International (CC BY 4.0) License.

Originally published at:

Purves, Ross S; Wartmann, Flurina M (2023). Characterising and mapping potential and experienced tranquillity: From a state of mind to a cultural ecosystem service. *Geography Compass*, 17(11):12726.

DOI: <https://doi.org/10.1111/gec3.12726>

Characterising and mapping potential and experienced tranquillity: From a state of mind to a cultural ecosystem service

Ross S. Purves¹  | Flurina M. Wartmann^{2,3} 

¹Department of Geography, University of Zurich, Zurich, Switzerland

²Geography & Environment, School of Geosciences, University of Aberdeen, Aberdeen, UK

³School of Geography and the Environment, University of Oxford, Oxford, UK

Correspondence

Ross S. Purves, Department of Geography, University of Zurich, Zurich 8057, Switzerland.
Email: ross.purves@geo.uzh.ch

Funding information

Schweizerischer Nationalfonds zur Förderung der Wissenschaftlichen Forschung, Grant/Award Number: 200020E_186389

Abstract

Tranquil places that induce a sense of calm and peacefulness are important for those seeking respite from their stressful everyday lives. Although tranquillity is a word commonly used in everyday English, we show that its definition is complex, most often encompassing sight and hearing, with strong cultural and historical influences. To shed light on the concept of tranquillity and related research in geography and other disciplines, we (i) trace how tranquillity has been conceptualised and characterised (ii) outline how the potential for tranquillity has been modelled in Geographic Information Systems (GIS) and (iii) highlight methods capable of extracting individual experiences of tranquillity from interviews, public participation GIS and text analysis. We conclude by charting a research agenda for tranquillity that makes a case for *theory development* across disciplines including human geography, GIS, and environmental psychology, with *interdisciplinary methodologies* that should be implemented and developed to better reflect the importance of the combination of physical environment and lived human experience in shaping experienced tranquillity. Based on its importance for people's well-being, we argue for the recognition of tranquillity as a cultural ecosystem service in its own right. Finally, we call for a more holistic inclusion of tranquillity in *policy-making and planning*, where a focus

This is an open access article under the terms of the [Creative Commons Attribution](https://creativecommons.org/licenses/by/4.0/) License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited.

© 2023 The Authors. Geography Compass published by John Wiley & Sons Ltd.

on tranquillity and associated positive landscape and sound-scape elements could help extend the focus beyond simply protection from noise, towards creating liveable and healthy environments for the future.

KEYWORDS

Geographic Information System, interdisciplinary approaches, mapping cultural ecosystem services, non-material benefits of nature, perception of urban green spaces, tranquillity

1 | INTRODUCTION

As global populations become more urban, and cities grow denser, so too grows the need of individuals to find respite from the hustle and bustle of everyday life. The COVID-19 pandemic, and the resulting restrictions on movement for city dwellers, forced many to seek such locations not in distant natural landscapes, but in their local surroundings (Berdejo-Espinola et al., 2021; Poortinga et al., 2021). In the United Kingdom, the importance of these *tranquil* places both in terms of planning and policy has been underpinned by the work of non-governmental organisations, most prominently the Campaign for the Protection of Rural England (CPRE), which championed the monitoring and mapping of tranquillity in England. More recently, in Switzerland the *Stiftung Landschaft Schweiz* commissioned a map of tranquillity of the densely populated Swiss Central Plateau, inspired by the CPRE's work and catalysed by the need of the population find places to relax in their nearby surroundings during COVID-19 (Leeb et al., 2020).

However, the importance of nature, greenery and a need for respite from the sounds, sights and smells of urban life are not new. That tranquillity as a concept related to landscapes seems so firmly anchored in British discussions can be traced back to the Romantic movement of the late 18th century. As the industrial revolution gathered pace, with Europe often at war, the Romantics placed great emphasis on seeking out and experiencing the natural world through all of the senses, best of all in solitude, separating the observer from the worries of everyday life. Tranquillity thus required not only the right combination of environmental conditions, it was also a state of mind. Crucially, the Romantic movement did not just describe natural places—it popularised them through travel writing and guides—perhaps best known in Wordsworth's *A Guide through the District of the Lakes 1835*. In behaviour echoed by modern contemporaries, Wordsworth argued for the protection of the Lake District's character and tranquillity from industrialisation, for example, through the building of railway lines. These roots matter, since they help explain why protecting tranquillity has had so much attention in a UK context, and simultaneously demonstrate that the concept is inextricably linked to culture and history.

Conceptually, tranquillity is an excellent example of a so-called *cultural ecosystem service* (CES). CES are in turn defined as 'non-material benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation and aesthetic experiences' (MA, 2005). In the 21st century, the importance of such non-material benefits has been brought into sharp focus globally in a number of ways. First, there is growing evidence that the availability of green space in and near urban areas is related to and correlates with well-being in multiple ways, including child development, physical and mental health and life expectancy (Barboza et al., 2021; Bauwelinck et al., 2021; Reyes-Riveros et al., 2021; White et al., 2021). Second, policy increasingly recognises the urgency of monitoring and understanding the diverse ways in which individuals and groups appreciate, experience and benefit from their surroundings (Edwards et al., 2022; Uebel et al., 2021; Venter et al., 2021). Third, frameworks such as the Millennium Ecosystem Assessment (MA, 2005) and the Sustainable Development Goals (United Nations, 2022) explicitly include targets which aim to quantify these experiences. However, efforts to quantify and describe these non-material benefits lag biophysically driven ecosystem services (Chan et al., 2012), such as provisioning services

(e.g. availability of fresh water) and regulating services (e.g. carbon storage in peat bogs) which are increasingly the subject of global estimates, often underpinned by remotely sensed data.

At a more local level, a desire to plan and develop cities which promote healthy, sustainable living (Allam & Jones, 2021) has led to a need to better understand how planning policy can promote, protect and develop spaces providing non-material benefits to citizens (Dickinson & Hobbs, 2017; Kabisch, 2015). Traditionally, such settings include urban green spaces such as parks and other formal and informal public spaces, including, for example, cemeteries (Nordh et al., 2022) and allotments (Hawkins et al., 2013). These are enjoyed for a wide range of activities, including recreation in the form of individual exercise and team sports, socialising and more solitary and reflective activities (Sang et al., 2016). Specifically, tranquillity and peace or absence of disturbance are often mentioned as reasons for visiting such spaces for recreation (Campagnaro et al., 2020; Hawkins et al., 2013; Nordh et al., 2022; Pinto et al., 2021; Wartmann & Purves, 2018). However, urban green spaces also find themselves increasingly under pressure as a result of urban development and densification, lack of funding for their maintenance, and concerns about safety and conflicts between activities performed by different and diverse groups (Garcia-Garcia et al., 2020; Tappert et al., 2018).

The astute reader will have noted that although we have discussed tranquillity historically, and argued that we believe tranquillity is an important CES, we have refrained from providing a definition. Rather like place (Cresswell, 2006), tranquillity¹ is not a specialised academic term, and is in common use in the English-speaking world. And, like place, tranquillity appears to be a term which is not straightforward to translate into other languages without recourse to descriptions of its properties. In the follow sections of our paper we therefore review the historical roots of tranquillity and its relationship to landscape, before introducing seminal work on tranquillity in environmental psychology. Quantifying non-material benefits through CESs like tranquillity typically involves some form of mapping. We introduce two contrasting approaches here—spatially continuous models of potential tranquillity, created by combining layers of proxy data and identification and extraction of specific places where people report experiencing tranquillity. Spatially continuous models are typically implemented in Geographic Information Systems (GIS) using multi-criteria evaluation (MCE). Approaches to extracting individual experiences include interviews, the use of public participation GIS (PPGIS) and computational text analysis. Whichever approach is used, the resulting information is often symbolised as points on maps, allowing these approaches to be linked back to models of potential tranquillity. The contrasts between approaches modelling potential and experienced tranquillity, and their links to historical definitions of tranquillity and tranquillity related theory lead us to a research agenda for future work.

2 | POPULAR NOTIONS OF TRANQUILLITY

We focus in this section on conceptualising tranquillity in the context of the English language, but acknowledge that related terms may exist in other languages. For example, Hu et al. (2020) trace notions of tranquillity in a Chinese cultural and linguistic context. Similar to other concepts used in everyday discourses, for example, *landscape* (van Putten et al., 2020), *tranquillity* may not be easily translatable across cultural and linguistic contexts and we caution against generalising concepts based on research primarily performed in English-speaking contexts (Blasi et al., 2022).

In contemporary English, the Oxford English Dictionary lists two meanings of the term 'tranquillity', one relating to 'the mind or affairs' and one describing 'the weather, the elements etc.' (OED, 2023). The word tranquillity stems from Latin *tranquillitas*, and was a central idea in the stoic philosopher Seneca's work *De Tranquillitate Animi*, who focussed on the notion of tranquillity as a state of mind. Use of the word in English is often attributed to Shakespeare, who coined, or at least popularised from previous vernacular use, many words in the English language, including both *tranquil* in Othello and *tranquillity* in Henry IV (Collins Dictionary, 2016). Shakespeare also often emphasised the idea of a tranquil state of mind (or lack thereof) in his characters.

In the 17th century tranquillity began to be used as a term to designate areas or places such as gardens deemed beneficial to inducing this mental state (Zhuang, 2021), marking a move towards associating tranquillity with

environmental settings and landscapes. In the 18th century, this link between environment and state of mind was emphasised by the siting of some British 'asylums', often privately owned care institutions for mentally ill patients (Parry-Jones, 1972) in rural landscapes, thus directly linking (the restoration of) a tranquil mental state to landscape characteristics (Hickman, 2009).

Through the 18th, 19th and 20th centuries tranquillity became a common theme in writing about landscapes in Britain, exemplified by authors such as William Gilpin, Dorothy and William Wordsworth, and Nan Shepherd. This popularising of tranquillity through literature is likely one reason for its emergence as an important topic in policy and planning in the UK (Chesnokova et al., 2019). These cultural roots are important since they help to understand why tranquillity, at least in British writing, seems to refer to more than simply the absence of noise, and explain why tranquil settings are related to visual as well as audible components.

3 | TRANQUILLITY AND ATTENTION RESTORATION THEORY

Scientific interest in how people perceive environments and their qualities emerged in the 20th century as environmental psychologists elicited the qualities attributed to environments by individuals. For example, participants in a variety of outdoor environments in Vancouver rated adjectives and how well these described their location, with tranquil listed as an adjective amongst others including peaceful, calm and placid (Russell et al., 1981). The tranquil adjective was often clustered with adjectives indicating pleasantness, which motivated further research into disentangling the meanings of such apparently positively connoted terms. In one experiment, American undergraduate students were shown images of predefined environmental settings that they rated for one of six adjectives, including tranquillity, pleasantness, spaciousness and mystery (Herzog & Bosley, 1992).

The adjectives were consistently associated with different environmental scenes, with fields/forests scenes and large (still) water bodies rated as more tranquil than pleasant, but rushing water more pleasant than tranquil (Herzog & Bosley, 1992). Further research into tranquillity in different settings found that images showing natural settings with fields and shrubs were significantly more highly rated for tranquillity compared to buildings and streets in urban settings (Herzog & Chernick, 2000). This perceived lack of tranquillity in urban settings can be related to Attention Restoration Theory (Kaplan, 1995; Kaplan & Kaplan, 1989) which postulates that living in urban environments requires directed attention—needed to, for example, cross a busy street—and eventually results in attentional fatigue. This fatigue, it is argued, can be counteracted by spending time in restorative environments which induce a feeling of being away from everyday life, allow one to feel immersed, and allow undirected, effortless attention ('soft fascination') in aesthetically pleasing environments. This could, for example, be watching the wind ripple over water, hearing and seeing leaves rustling or watching clouds passing by. The combination of soft fascination and aesthetic pleasure was referred to as tranquillity by Herzog and Bosley (1992).

Influenced by Attention Restoration Theory, researchers started investigating how both visual and auditory components of the environment influenced perception of tranquillity in a general, rather than individual sense (Pheasant et al., 2010; Watts et al., 2011; Watts & Pheasant, 2013, 2015). For instance, participants were shown images of different environmental settings in the UK, before selecting the image best representing 'a quiet peaceful place, a good place to get away from the demands of everyday life' (Pheasant et al., 2010, p. 503). Based on these image rating experiments, follow-up studies in psycho-acoustic suites (rooms controlling the sound levels and visual stimuli experienced by participants) demonstrated how auditory and visual factors interact, with tranquillity ratings for visual-only stimuli generally higher than for the auditory-only stimuli (Pheasant et al., 2010). Assessing only auditory stimuli on ratings of tranquillity, mechanical sounds had a negative influence, biological sounds a positive, while the sound of water and weather had no significant effect (Pheasant et al., 2010). These findings contradicted previous results where water sounds were positively rated (Watts et al., 2009). However, most importantly they emphasise the importance of combinations of the senses with respect to tranquil or peaceful places with restorative effects.

4 | MODELLING (SPATIALLY CONTINUOUS) POTENTIAL TRANQUILLITY

Modelling tranquillity, and linking it to the environment, requires spatially explicit data capturing properties thought to be linked to tranquillity. There are essentially two ways in which this can be done. The first takes a place, or object-based approach, and aggregates spatial data to predict potential tranquillity for specific locations. The second approach creates spatially continuous models of tranquillity, typically combining raster data sets through some form of weighted overlay. Since these approaches are usually based solely on spatially explicit data their focus is on the creation of models of potential tranquillity, and they by definition ignore individual preferences and states of mind.

Work by Pheasant et al. (2010) is an excellent exemplar for place-based approaches, and builds coherently on the factors identified in the previous section. They developed a simple regression based model linking tranquillity (TR) to three factors: the percentage of visual natural and contextual features, anthropogenic sounds and moderating factors with positive (e.g. sound of water) or negative (e.g. litter, graffiti) influences, which can be either visual or auditory.

This approach was used to estimate potential tranquillity in urban and rural settings (Watts et al., 2011; Watts & Pheasant, 2013, 2015). Approaches taken to estimating values for the factors included the use of photographs to classify the proportions of natural and contextual features and mapped potential traffic noise to quantify anthropogenic sounds. Watts and colleagues also compared predicted tranquillity ratings with empirical studies and found that their approach, despite its relative simplicity, captured perceived tranquillity across a range of locations.

The emergence of spatially continuous maps of tranquillity predates contemporary efforts to spatially delineate and quantify CESs generally, but follows a very similar methodology. Broadly speaking, all such mapping projects are driven by three key factors (Braun et al., 2018):

1. The increasing importance attached to identifying and protecting tranquillity and other CES through spatially explicit mapping.
2. The availability of a wide range of spatial data, often produced by remote sensing, at increasingly fine scales.
3. Increasing awareness of the use and potential of GIS to quantify and map a wide range of spatial processes.

Some of the earliest work on mapping tranquillity was commissioned in the context of development of a new transport corridor, and aimed to identify undisturbed areas which were not already protected in some way (Rendel, 1998). This work identified factors detracting from tranquillity and combined them through Boolean overlay to identify potentially undisturbed areas. Bell (1999) took a similar approach, but considered the mitigating effect of woodland on disturbance, therefore including factors which not only detracted from tranquillity, but those which potentially added to it. The choice of factors used in these early maps of tranquillity for use in planning and policy was though primarily based on expert judgement.

Subsequent work commissioned by the Council for the Protection of Rural England (CPRE), recognised the inherent subjectiveness of tranquillity and used consultation to identify and rank factors adding to, and detracting from, tranquillity (Jackson et al., 2008; MacFarlane et al., 2004). In a national study, public consultations were carried out at outdoor locations across England, where over thousand participants selected factors which added to or decreased to tranquillity. Having identified these factors, a second set of questions was answered by a subset of participants who rated images for the perceived naturalness of their land covers, the impacts of people present on tranquillity and the extent to which human development (e.g. roads, buildings, pylons and so on) detracted from tranquillity.

The factors elicited were operationalised in a GIS analysis, where a MCE was used to combine 21 positive and 21 negative factors to produce a spatially-continuous map of tranquillity. The highest weighted positive factors were *seeing a natural landscape* and *hearing birdsong*, while the most negative factors were hearing constant noise from cars, lorries and/or motorbikes and *seeing lots of people* respectively (Figure 1). A similar MCE approach to mapping tranquillity was applied to the Swiss Central Plateau (Leeb et al., 2020). Here criteria were adapted from the original study by Jackson et al. (2008), though the authors acknowledged a need to identify culturally appropriate factors in a Swiss context.

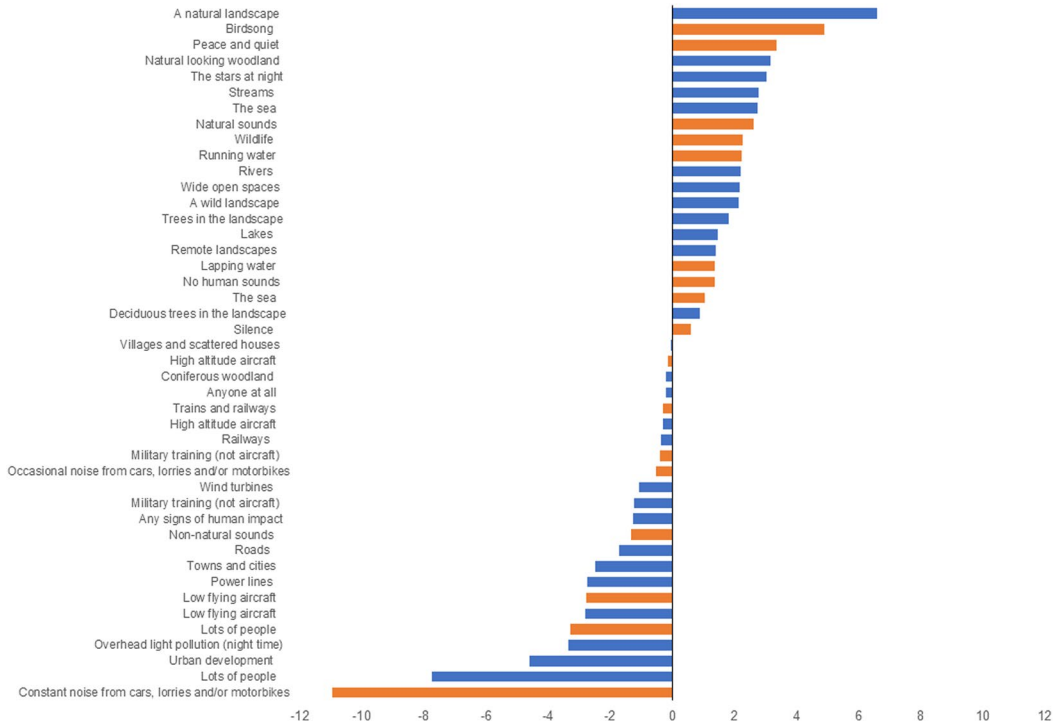


FIGURE 1 Positive and negative weights assigned to visible (blue) and audible (orange) factors adding to and detracting from tranquillity according to Jackson et al. (2008).

In another study in the Dorset Area of Outstanding Natural Beauty in England, Hewlett et al. (2017) built on the CPRE's approach to tranquillity mapping, by collecting views from different stakeholder groups. The researchers assessed institutions' and residents' views through participatory consultations and conducted a household and visitor survey where participants listed and ranked five aspects that contributed to and detracted from tranquillity respectively. These assessments resulted in local maps for these stakeholder groups that differed markedly. For example, institutions considered more factors to detract from tranquillity, leading to smaller core tranquil areas than perceived by residents (Hewlett et al., 2017).

All of these mapping exercises rely on spatial data as proxies for properties adding to or detracting from tranquillity, which can be combined to produce maps of potential relative tranquillity. However, they cannot capture individual variation in perception and experience of environments. They can be seen as calculating surfaces of potential tranquillity where, given certain preferences and the environment, tranquillity could be experienced. These maps can thus be interpreted as representing the supply of the CES tranquillity, but not necessarily where demand is met and tranquillity is 'consumed' (Andersson et al., 2015).

5 | IDENTIFYING AND DESCRIBING EXPERIENCED TRANQUIL PLACES

As well as the potential to experience tranquillity, it is also important to understand where people actually find and experience tranquillity. Here, we review methodological developments related to identifying and describing tranquil places using a variety of sources and methods, ranging from interviews through PPGIS to analysis of social media and text. Our starting point is the assumption that when individuals experience tranquillity, they are also able to recognise and describe it. In contrast to the work described above, where the focus was typically on eliciting generic properties of tranquillity, this research focuses on experiences linked to specific places. As such, these experiences can be linked

to models of place, in that tranquillity is related to location (named places), locale (properties of a place conducive to tranquillity) and sense of place (the meanings and emotions associated with tranquil places) (Agnew, 1987).

Interviews and PPGIS are one way of identifying the tranquil places people experience. Here, two central questions can be posed. Firstly, both approaches can be carried out in situ, with participants describing their current location and its surroundings or, more commonly in PPGIS, participants may identify and value a number of local places and their properties using a mapping interface. Secondly, tranquillity may be explicitly elicited—for example, by asking an individual if and why a location is (or is not) tranquil (Wartmann & Mackaness, 2020), or inferred—for instance by mapping places linked to categories defined by researchers. For example, in one study participants were asked to indicate places where they could 'relax recharge' and these were subsequently categorised as being locations related to 'spirituality and tranquillity' (Nordh et al., 2022). Although these approaches allow in-depth exploration of specific places, they are difficult to scale, and many researchers have turned to social media as a general way of understanding how people relate to place and landscape (Ghermandi & Sinclair, 2019; Purves et al., 2011; Tieskens et al., 2018).

One approach uses georeferenced photographs and searches for tags or keywords associated with properties of tranquillity to explore larger regions. Typically, these terms include words such as 'peaceful', 'quiet' and 'tranquillity' itself. Using such an approach, Wartmann et al. (2019) mapped experienced tranquillity across Scotland finding hotspots on the Scottish West coast and pockets around Loch Lomond and the Trossachs National Park, but did not find evidence for experienced tranquillity in more remote mountainous areas. Analysing the content of landscape pictures with tags related to tranquillity and those without revealed significant differences in image content and composition for the two sets. For example, photos with tranquil tags more often included water bodies, boats, greenery and sunset/sunrise, and less often people and buildings (Wartmann et al., 2019) linking back to concepts suggested by Attention Restoration Theory (Kaplan, 1995).

While social media image tags provide some insights into experienced tranquillity, they lack the deeper context we can find in written sources describing tranquil scenes. Applying a combination of close reading and natural language processing on historic and contemporary descriptions of the English Lake District, Chesnokova et al. (2019) extracted descriptions of silence and tranquillity, indicating a shift from historical mentions of absolute silence in Victorian times to mentions of tranquillity in modern times. Contemporary descriptions were compared with a map of potential tranquillity (Jackson et al., 2008). Figure 2 shows tranquil places were found both within homogeneous, large areas closely matching modelled areas of high potential tranquillity, and in smaller pockets of tranquillity contrasting with nearby non-tranquil areas such as major roads (Chesnokova et al., 2019).

Bridging work on spatially continuous models of potential tranquillity and experienced tranquillity, a crowd-sourced set of descriptions was used to explore the relationship between photographs described as tranquil and land cover over the UK as a whole. More tranquil photographs were found in urban and suburban land cover and broad leaf woodland than would be expected from the overall occurrence of these land cover classes (Wartmann, Koblet, et al., 2021). In a global model, physical properties of landscape including the land cover class freshwater, naturalness and lower elevations were significant positive predictors of experienced tranquillity, whereas built-up areas were a significant negative predictor (Wartmann, Koblet et al., 2021). These contradictory results are important since they again emphasise the difference between modelling broad patterns of tranquillity, where factors such as urbanisation have an overall negative effect, and the importance of nonetheless capturing small pockets of tranquillity in such settings, where they may benefit a much larger underlying population.

6 | CHARTING A RESEARCH AGENDA FOR TRANQUILLITY

In this article, we firstly traced the roots of the relationship between tranquillity, landscape and culture. Secondly, we described work in environmental psychology which linked theory to empirical data on tranquil places. Thirdly, we highlighted the development of approaches to model the potential for tranquillity by combining different spatially continuous layers in GIS. Finally, we examined a range of methodological approaches to elicit individual experiences of tranquil places, noting the paradox between experienced tranquillity in areas where the potential tranquillity would be classed as low

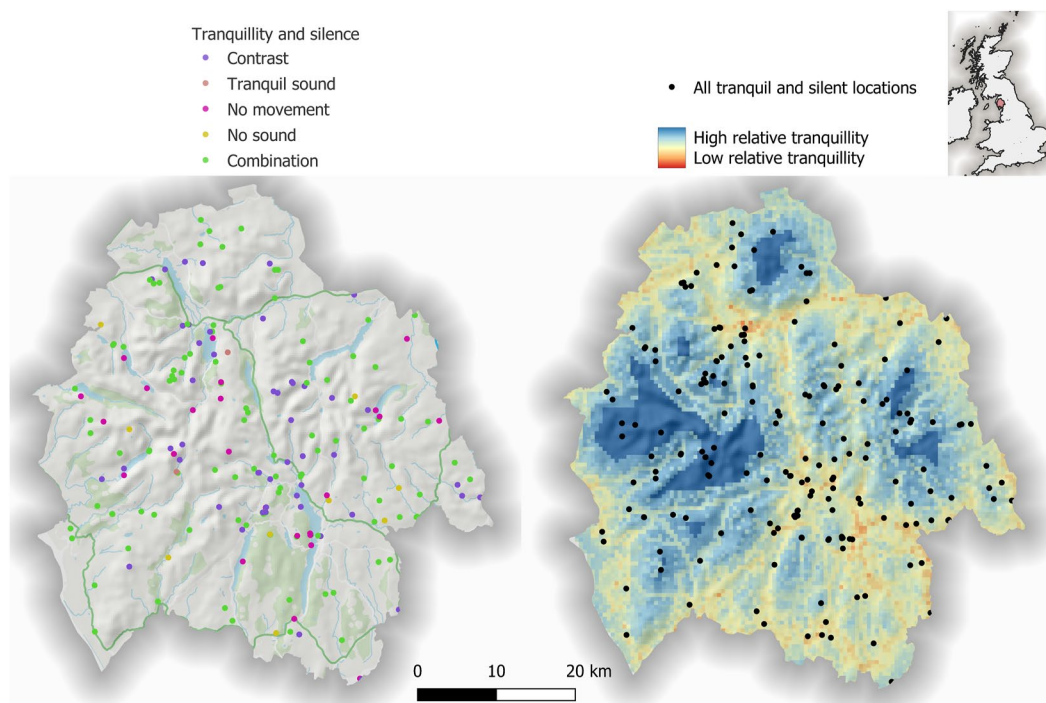


FIGURE 2 Punctual locations of experienced tranquillity extracted from textual descriptions Chesnokova et al. (2019) (left) compared with spatially continuous potential tranquillity Jackson et al. (2008) in the Lake District. Sources: Punctual locations derived from Geograph data under a CC-BY-SA Licence a (<https://creativecommons.org/licenses/by-sa/2.0/>) and classified by Chesnokova et al. (2019); Background mapping Ordnance Survey Open Zoomstack under an Open Government Licence (<https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/>); National Tranquillity Mapping Data 2007 developed for the Campaign to Protect Rural England and Natural England by Northumbria University. OS Licence number 100018881.

(e.g. urban parks, viewpoints along busy roads), suggesting a tension between models of potential and experienced tranquillity, or between approaches capturing supply versus ‘consumption’ of tranquillity as a CES (Andersson et al., 2015).

We traced the emergence of tranquillity in different fields, and observed how methods to map potential tranquillity gradually included more factors. In particular, contemporary approaches to mapping potential tranquillity include not only absence of visual and auditory disturbance, but also a range of, often culturally specific, factors adding to tranquillity, such as hearing bird song or seeing the sky. Methods to describe tranquillity as experienced at specific locations often identified contrast with surroundings as an important factor. We note that descriptions of tranquillity may use synonyms such as peaceful or quiet, and emphasise that these go beyond purely auditory measures, with the combination of senses leading to so-called quiet contemplation, as suggested by Attention Restoration Theory, being crucial. We therefore define *tranquil places as those offering a sense of contemplation and peace through a mixture of visual and auditory stimuli combined with the relative absence of disturbing factors.*

In the following, we outline a research agenda focussing on such tranquil places and revolving around three aspects: theory, methods and integration with policy and planning.

6.1 | Theory, culture and language

Research on tranquillity has been conducted in different disciplines, including environmental psychology (Herzog & Bosley, 1992), acoustics (Pheasant et al., 2010; Watts & Pheasant, 2015), landscape planning and Geographic

Information Science (Hewlett et al., 2017; Jackson et al., 2008), with some crossover between disciplines through research in for example, digital humanities (Chesnokova et al., 2019). However, this crossover has not been extended to the theories and concepts used in understanding and framing tranquillity. For instance, understanding tranquillity and tranquil places from place theories in geography (Agnew, 1987; Cresswell, 2006; Tuan, 1974) would allow for further advances and insights into thinking about how certain places come into being and are perceived as tranquil, and how this affects individual's relation to such places. Furthermore, as an experienced quality of places or landscapes, there is a need to take into account diverse cultural and linguistic settings.

Such theories of tranquillity would move beyond seeing tranquillity as a function of a combination of environmental characteristics, to recognising it as being co-constructed between the physical properties of landscapes and the social perspectives of the people imbuing these places with meaning. We argue that it would provide a stronger basis for tranquillity as a CES in its own right. This is important, since existing CES categories such as 'recreation' or 'aesthetic' (MA, 2005) are not sufficiently fine-grained to capture tranquillity's subtle combination of visual and auditory factors. Equally, measuring tranquillity only as a function of absence (of people, sounds, infrastructure) clearly leads to us neglecting of pockets of tranquillity, which provide important benefits to people (Korpilo et al., 2023). Nonetheless, we do not claim that tranquillity is a universally important CES. It appears to be a basic level term in (British) English to describe a class of locations—that is one to say whose shared meaning is specific enough to capture shared conceptualisations (Tversky & Hemenway, 1983)—but further research is needed to explore the importance of tranquil places in other languages and cultures.

6.2 | Interdisciplinary methods

In order to map and model experienced tranquillity and tranquil places, methodological triangulation is required that captures the rich lived experience of tranquillity and tranquil places, and that can productively combine the advantages of both quantitative and qualitative approaches. Qualitative methods include transect walks, interviews and focus groups, all of which have been effectively used to explore ways in which individuals and groups experience places (Hemmersam & Morrison, 2016; Hewlett & Brown, 2018; Wartmann & Purves, 2018). The need for quantitative data in policy is often related to both in situ and online surveys exploring landscape perception and preference from which statistical relationships can be derived (Hegetschweiler et al., 2022; Marafa et al., 2018; Wartmann, Stride, et al., 2021). Including tranquillity in such surveys requires appropriate ways of posing questions to participants, which could best be informed by more qualitative methods probing local cultural landscape values and their links to tranquillity. Mapping experienced tranquillity requires the use of spatially explicit approaches, perhaps most obviously through PPGIS (Fagerholm et al., 2016; Nordh et al., 2022). However, doing so again requires that the categories used in mapping include representations of tranquillity which fit local cultural settings. All of these approaches focus on methods requiring active participants, and though these produce very rich data, they are often argued to be expensive and difficult to repeat.

This has led to increasing interest in the use of passively crowdsourced data, most often in the form of social media studies (Ghermandi & Sinclair, 2019; Havinga et al., 2021). Recent work has demonstrated that combining such approaches with more traditional participatory mapping is a powerful way of exploring landscape preferences (Olafsson et al., 2022). In parallel, developments in machine learning have led to increasing interest in extracting implicit information from text and images uploaded as social media, for example, to identify proxies for sound emitters which may then impact on tranquillity (Aiello et al., 2016). However, we sound a note of caution here. Firstly, such approaches almost always assume a universal model of landscape and landscape categories, typically based on Western and English-speaking conceptualisations, despite ample evidence that this is not the case (Blasi et al., 2022; Majid et al., 2018; van Putten et al., 2020). Secondly, models based on proxies by definition cannot represent the ways in which individuals experience a space. Moving from social media data to unstructured text sources (that are not neatly parcelled into tags and coordinates) and which contain explicit and rich descriptions of tranquillity might be one way of capturing more individual experiences (Huai & Van de Voorde, 2022).

Initial work has shown the potential of such approaches in providing opportunities to explore change not only in where, but how tranquillity was perceived historically (Chesnokova et al., 2019). Critically combining such approaches with state of the art methods to analyse imagery in urban areas and high resolution spatial data could help to bridge the gap between experienced and potential tranquillity, by linking specific places and individual experiences to tranquillity models. As a first step to more integrative representations of tranquillity, we recommend routinely combining the results of different approaches and explicitly differentiating between models of potential tranquillity and locations of experienced tranquillity. Figure 2 is an example of such a combined representation. Finally, linking experienced tranquillity to soundscapes is a promising approach in local urban contexts, especially with respect questions around policy and planning (Korpilo et al., 2023; Thomas et al., 2023).

6.3 | Policy and planning

Policies related to tranquillity often do not reference tranquillity directly, but rather focus on factors detracting from tranquillity, such as noise, which can be more easily quantified. For example, the World Health Organisation (WHO) provides guidance on noise levels in different environments for the WHO European Region (World Health Organisation, 2018). In turn, these form the basis for policies such as the European Environmental Noise Directive and associated reports (EEA, 2020; Nugent et al., 2016). For instance, the European Environmental Agency published a report on 'Quiet Areas in Europe', defined as areas 'largely undisturbed by noise from traffic, industry or recreational activities'. Such policies and associated definitions thereby focus on the absence of disturbance, whereas other policy frameworks, especially in the UK, specify the protection of tranquillity more specifically. For example, the National Planning Framework in England, aims to: 'identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason' (GOV.UK, 2012). Updated guidance for planners (GOV.UK, 2014) now specifies what factors are considered relevant:

'For an area to justify being protected for its tranquillity, it is likely to be relatively undisturbed by noise from human sources that undermine the intrinsic character of the area. It may, for example, provide a sense of peace and quiet or a positive soundscape where natural sounds such as birdsong or flowing water are more prominent than background noise, for example, from transport. Consideration may be given to how existing areas of tranquillity could be further enhanced through specific improvements in soundscape, landscape design (e.g. through the provision of green infrastructure) and/or access'.

This guidance specifically mentions positive soundscapes and aspects planners can consider, such as a sense of peace and quiet, opening up the potential for perceived tranquillity to be assessed in addition to absence of noise. However, this example from policy and related planning guidance on how to protect, as well as enhance tranquil areas is the exception, rather than the norm. Based on the evidence that people ascribe high importance to tranquillity and give it as one of the major reasons for visiting green spaces, in conjunction with the health and other benefits described of (tranquil) green spaces (Ekkel and de Vries, 2017) including small pocket parks (Nordh & Østby, 2013; Peschardt et al., 2016), we believe that there is a need to place tranquillity higher up the policy agenda.

While continued efforts to protect tranquillity are important, there is also a need to focus more on creating tranquillity where it currently does not exist but can benefit large numbers of people (Ekkel and de Vries, 2017). Although many large cities have historic green spaces providing residents with pockets of tranquillity (Marafa et al., 2018), large peri-urban settlements may lack such large designated green spaces. Based on evidence that people can experience tranquillity in small areas and often by contrast (e.g. a small pond and a bench next to a busy road), a focus on such 'pocket parks' could provide tranquillity, improve social and environmental justice and improve accessibility to green spaces and their benefits for all (Nordh & Østby, 2013; Peschardt et al., 2016; Wolch et al., 2014), while also encouraging biodiversity in urban environments and, in turn, restorativeness (Young et al., 2020).

7 | CONCLUSIONS

Tranquil places—offering a sense of contemplation and peace through a mixture of visual and auditory stimuli combined with the relative absence of disturbing factors—provide an important CES. However, conceptualisations and definitions of tranquillity vary widely, and like place, tranquillity seems to be a slippery concept. Approaches to mapping tranquillity take two broad approaches—firstly mapping, often in a spatially continuous fashion—the *potential* for tranquillity and, secondly, recording locations where individuals *experience* tranquillity. We believe the greatest potential for protecting and enhancing tranquillity lies in interdisciplinary approaches. These approaches should include:

- Exploring ways in which tranquillity is understood through disciplines ranging from human geography, environmental psychology and linguistics, paying particular attention to differences between cultures, languages and population groups.
- Developing methods to combine empirical data with models capable of capturing and visualising potential and experienced tranquillity.
- Recognising tranquillity as a CES, with the caveat that its importance may not be universal, but vary cross-culturally and cross-linguistically.
- Including tranquillity in policy and planning such that tranquil areas in both urban and rural areas are preserved, and enhancing and developing new ways of providing tranquil respite in areas where citizens have little respite from busy urban settings.

ACKNOWLEDGEMENTS

Many thanks to Graeme Willis (Campaign to Protect Rural England) and Nick Groome (Ordnance Survey) for their help in accessing the National Tranquillity Mapping Data. We would like to thank all the contributors to Geograph British Isles (Creative Commons Attribution-ShareAlike 2.5 License) whose contributions were used to map tranquil and silent locations in the Lake District.

CONFLICT OF INTEREST STATEMENT

The authors have no conflicts of interest to declare.

ORCID

Ross S. Purves  <https://orcid.org/0000-0002-9878-9243>

Flurina M. Wartmann  <https://orcid.org/0000-0003-4788-2963>

ENDNOTE

¹ Tranquillity is also often spelt with a single 'l'.

REFERENCES

- Agnew, J. A. (1987). *Place and politics. The geographical mediation of state and society*. Allen & Unwin.
- Aiello, L. M., Schifanella, R., Quercia, D., & Aletta, F. (2016). Chatty maps: Constructing sound maps of urban areas from social media data. *Royal Society Open Science*, 3, 150690. <https://doi.org/10.1098/rsos.150690>
- Allam, Z., & Jones, D. S. (2021). Future (post-COVID) digital, smart and sustainable cities in the wake of 6G: Digital twins, immersive realities and new urban economies. *Land Use Policy*, 101, 105201. <https://doi.org/10.1016/j.landusepol.2020.105201>
- Andersson, E., Tengö, M., McPhearson, T., & Kremer, P. (2015). Cultural ecosystem services as a gateway for improving urban sustainability. *Ecosystem Services*, 12, 165–168. <https://doi.org/10.1016/j.ecoser.2014.08.002>
- Barboza, E. P., Cirach, M., Khomenko, S., Lungman, T., Mueller, N., Barrera-Gómez, J., Rojas-Rueda, D., Kondo, M., & Nieuwenhuijsen, M. (2021). Green space and mortality in European cities: A health impact assessment study. *The Lancet Planetary Health*, 5(10), e718–e730. [https://doi.org/10.1016/s2542-5196\(21\)00229-1](https://doi.org/10.1016/s2542-5196(21)00229-1)

- Bauwelink, M., Casas, L., Nawrot, T. S., Nemery, B., Trabelsi, S., Thomas, I., Aerts, R., Lefebvre, W., Vanpoucke, C., Van Nieuwenhuysse, A., Deboosere, P., & Vandenheede, H. (2021). Residing in urban areas with higher green space is associated with lower mortality risk: A census-based cohort study with ten years of follow-up. *Environment International*, 148, 106365. <https://doi.org/10.1016/j.envint.2020.106365>
- Berdejo-Espinola, V., Suárez-Castro, A. F., Amano, T., Fielding, K. S., Oh, R. R. Y., & Fuller, R. A. (2021). Urban green space use during a time of stress: A case study during the COVID-19 pandemic in Brisbane, Australia. *People and Nature*, 3, 597–609. <https://doi.org/10.1002/pan3.10218>
- Bell, S. (1999). Tranquillity mapping as an aid to forest planning. *Tech. Rep. 16*, Forestry Commission, Edinburgh. Retrieved from <https://cdn.forestresearch.gov.uk/1999/01/fcin016.pdf>
- Blasi, D. E., Henrich, J., Adamou, E., Kemmerer, D., & Majid, A. (2022). Over-reliance on English hinders cognitive science. *Trends in Cognitive Sciences*, 26(12), 1153–1170. <https://doi.org/10.1016/j.tics.2022.09.015>
- Braun, D., Damm, A., Hein, L., Petchey, O. L., & Schaepman, M. E. (2018). Spatio-temporal trends and trade-offs in ecosystem services: An earth observation based assessment for Switzerland between 2004 and 2014. *Ecological Indicators*, 89, 828–839. <https://doi.org/10.1016/j.ecolind.2017.10.016>
- Campagnaro, T., Vecchiato, D., Arnberger, A., Celegato, R., Da Re, R., Rizzetto, R., Semenzato, P., Sitzia, T., Tempesta, T., & Cattaneo, D. (2020). General, stress relief and perceived safety preferences for green spaces in the historic city of Padua (Italy). *Urban Forestry and Urban Greening*, 52, 126695. <https://doi.org/10.1016/j.ufug.2020.126695>
- Chan, K. M. A., Guerry, A. D., Balvanera, P., Klain, S., Satterfield, T., Basurto, X., Bostrom, A., Chuenpagdee, R., Gould, R., Halpern, B. S., Hannahs, N., Levine, J., Norton, B., Ruckelshaus, M., Russell, R., Tam, J., & Woodside, U. (2012). Where are cultural and social in ecosystem services? A framework for constructive engagement. *BioScience*, 62(8), 744–756. <https://doi.org/10.1525/bio.2012.62.8.7>
- Chesnokova, O., Taylor, J. E., Gregory, I. N., & Purves, R. S. (2019). Hearing the silence: Finding the middle ground in the spatial humanities? Extracting and comparing perceived silence and tranquillity in the English Lake District. *International Journal of Geographical Information Science*, 33(12), 2430–2454. <https://doi.org/10.1080/13658816.2018.1552789>
- Collins Dictionary. (2016). Etymology corner – Shakespeare the wordmaker. Retrieved from <https://blog.collinsdictionary.com/language-lovers/etymology-corner-shakespeare-the-wordmaker/>
- Cresswell, T. (2006). *Place*. Blackwell Pub.
- Dickinson, D. C., & Hobbs, R. J. (2017). Cultural ecosystem services: Characteristics, challenges and lessons for urban green space research. *Ecosystem Services*, 25, 179–194. <https://doi.org/10.1016/j.ecoser.2017.04.014>
- Edwards, R. C., Larson, B. M. H., & Church, A. (2022). A “magic teleportation machine”: Ethnically diverse green space users derive similar cultural ecosystem benefits from urban nature. *Urban Forestry and Urban Greening*, 67, 127409. <https://doi.org/10.1016/j.ufug.2021.127409>
- EEA. (2020). Environmental noise in Europe – 2020. EEA report 22/2019. *Tech. rep.*, European Environmental Agency, Luxembourg, Belgium. Retrieved from https://www.eea.europa.eu/publications/environmental-noise-in-europe/at_download/file
- Ekkel, E. D., & de Vries, S. (2017). Nearby green space and human health: Evaluating accessibility metrics. *Landscape and Urban Planning*, 157, 214–220. <https://doi.org/10.1016/j.landurbplan.2016.06.008>
- Fagerholm, N., Oteros-Rozas, E., Raymond, C. M., Torralba, M., Moreno, G., & Plieninger, T. (2016). Assessing linkages between ecosystem services, land-use and well-being in an agroforestry landscape using public participation GIS. *Applied Geography*, 74, 30–46. <https://doi.org/10.1016/j.apgeog.2016.06.007>
- García-García, M. J., Christien, L., García-Escalona, E., & González-García, C. (2020). Sensitivity of green spaces to the process of urban planning. Three case studies of Madrid (Spain). *Cities*, 100, 102655. <https://doi.org/10.1016/j.cities.2020.102655>
- Ghermandi, A., & Sinclair, M. (2019). Passive crowdsourcing of social media in environmental research: A systematic map. *Global Environmental Change*, 55, 36–47. <https://doi.org/10.1016/j.gloenvcha.2019.02.003>
- GOV.UK. (2012). The National Planning Policy Framework. Retrieved from <https://www.gov.uk/guidance/national-planning-policy-framework/15-conserving-and-enhancing-the-natural-environment>
- GOV.UK. (2014). Guidance: Noise. Retrieved from <https://www.gov.uk/guidance/noise-2>
- Havinga, I., Marcos, D., Bogaart, P. W., Hein, L., & Tuia, D. (2021). Social media and deep learning capture the aesthetic quality of the landscape. *Scientific Reports*, 11(1), 20000. <https://doi.org/10.1038/s41598-021-99282-0>
- Hawkins, J. L., Mercer, J., Thirlaway, K. J., & Clayton, D. A. (2013). “Doing” gardening and “being” at the allotment site: Exploring the benefits of allotment gardening for stress reduction and healthy aging. *Ecopsychology*, 5(2), 110–125. <https://doi.org/10.1089/eco.2012.0084>
- Hegetschweiler, K. T., Wartmann, F. M., Dubernet, I., Fischer, C., & Hunziker, M. (2022). Urban forest usage and perception of ecosystem services – A comparison between teenagers and adults. *Urban Forestry and Urban Greening*, 74, 127624. <https://doi.org/10.1016/j.ufug.2022.127624>
- Hemmersam, P., & Morrison, A. (2016). Place mapping – Transect walks in arctic urban landscapes. *SPOOL*, 3, 23–36.

- Herzog, T. R., & Bosley, P. J. (1992). Tranquility and preference as affective qualities of natural environments. *Journal of Environmental Psychology*, 12(2), 115–127. [https://doi.org/10.1016/s0272-4944\(05\)80064-7](https://doi.org/10.1016/s0272-4944(05)80064-7)
- Herzog, T. R., & Chernick, K. K. (2000). Tranquility and danger in urban and natural settings. *Journal of Environmental Psychology*, 20(1), 29–39. <https://doi.org/10.1006/jevp.1999.0151>
- Hewlett, D., & Brown, L. (2018). Planning for tranquil spaces in rural destinations through mixed methods research. *Tourism Management*, 67, 237–247. <https://doi.org/10.1016/j.tourman.2018.01.011>
- Hewlett, D., Harding, L., Munro, T., Terradillos, A., & Wilkinson, K. (2017). Broadly engaging with tranquility in protected landscapes: A matter of perspective identified in GIS. *Landscape and Urban Planning*, 158, 185–201. <https://doi.org/10.1016/j.landurbplan.2016.11.002>
- Hickman, C. (2009). Cheerful prospects and tranquil restoration: The visual experience of landscape as part of the therapeutic regime of the British asylum, 1800–60. *History of Psychiatry*, 20(4), 425–441. <https://doi.org/10.1177/0957154x08338335>
- Hu, M., Zhang, Y., Zhang, H., Lu, Y., Zuo, L., Zhuang, M., Liu, W., Zhang, J., & Zhang, H. (2020). How do Chinese tourists perceive tranquility during the tour? *Tourism Management Perspectives*, 34, 100666. <https://doi.org/10.1016/j.tmp.2020.100666>
- Huai, S., & Van de Voorde, T. (2022). Which environmental features contribute to positive and negative perceptions of urban parks? A cross-cultural comparison using online reviews and natural language processing methods. *Landscape and Urban Planning*, 218, 104307. <https://doi.org/10.1016/j.landurbplan.2021.104307>
- Jackson, S., Fuller, D., Dunsford, H., Mowbray, R., Hext, S., MacFarlane, R., & Haggett, C. (2008). Tranquillity mapping: Developing a robust methodology for planning support. Report to the Campaign to Protect Rural England, Centre for Environmental & Spatial Analysis, Northumbria University, Bluespace environments and the University of Newcastle upon Tyne.
- Kabisch, N. (2015). Ecosystem service implementation and governance challenges in urban green space planning—The case of Berlin, Germany. *Land Use Policy*, 42, 557–567. <https://doi.org/10.1016/j.landusepol.2014.09.005>
- Kaplan, R., & Kaplan, S. (1989). *The experience of nature: A psychological perspective*. Cambridge University Press.
- Kaplan, S. (1995). The restorative benefits of nature: Toward an integrative framework. *Journal of Environmental Psychology*, 15(3), 169–182. [https://doi.org/10.1016/0272-4944\(95\)90001-2](https://doi.org/10.1016/0272-4944(95)90001-2)
- Korpilo, S., Nyberg, E., Vierikko, K., Nieminen, H., Arciniegas, G., & Raymond, C. M. (2023). Developing a multi-sensory public participation GIS (MSPPGIS) method for integrating landscape values and soundscapes of urban green infrastructure. *Landscape and Urban Planning*, 230, 104617. <https://doi.org/10.1016/j.landurbplan.2022.104617>
- Leeb, C., van Strien, M. J., Rodewald, R., & Grêt-Regamey, A. (2020). Eine “Tranquillity-Map” für das Schweizer Mittelland. *Tech. rep.* <https://doi.org/10.3929/ethz-b-000430857>
- MA. (2005). *Millennium ecosystem assessment*. World Resources Institute.
- MacFarlane, R., Haggett, C., Fuller, D., Dunsford, H., & Carlisle, B. (2004). Tranquillity mapping: Developing a robust methodology for planning support. Tech. rep., Report to the Campaign to Protect Rural England, Countryside Agency, North East Assembly, Northumberland Strategic Partnership, Northumberland National Park Authority and Durham County Council, Centre for Environmental & Spatial Analysis, Northumbria University.
- Majid, A., Roberts, S. G., Cilissen, L., Emmorey, K., Nicodemus, B., O’grady, L., Woll, B., LeLan, B., De Sousa, H., Cansler, B. L., Shayan, S., de Vos, C., Senft, G., Enfield, N. J., Razak, R. A., Fedden, S., Tufvesson, S., Dingemanse, M., Ozturk, O., & Levinson, S. C. (2018). Differential coding of perception in the world’s languages. *Proceedings of the National Academy of Sciences*, 115(45), 11369–11376. <https://doi.org/10.1073/pnas.1720419115>
- Marafa, L. M., Tsang, F., Watts, G., & Yuan, X.-m. (2018). Perceived tranquility in green urban open spaces. *World Leisure Journal*, 60(3), 221–234. <https://doi.org/10.1080/16078055.2018.1496529>
- Nordh, H., & Østby, K. (2013). Pocket parks for people—A study of park design and use. *Urban Forestry and Urban Greening*, 12(1), 12–17. <https://doi.org/10.1016/j.ufug.2012.11.003>
- Nordh, H., Ståhl Olafsson, A., Kajosaari, A., Præstholm, S., Liu, Y., Rossi, S., & Gentin, S. (2022). Similar spaces, different usage: A comparative study on how residents in the capitals of Finland and Denmark use cemeteries as recreational landscapes. *Urban Forestry and Urban Greening*, 73, 127598. <https://doi.org/10.1016/j.ufug.2022.127598>
- Nugent, C. E., Blanes, N. E.-A., Fons, J. E.-A., & Sáinz de la Maza, M. E.-A. (2016). Quiet areas in Europe: The environment unaffected by noise pollution.
- Olafsson, A. S., Purves, R. S., Wartmann, F. M., Garcia-Martin, M., Fagerholm, N., Torralba, M., Albert, C., Verbrugge, L. N., Heikinheimo, V., Plieninger, T., Bieling, C., Kaaronen, R., Hartmann, M., & Raymond, C. M. (2022). Comparing landscape value patterns between participatory mapping and geolocated social media content across Europe. *Landscape and Urban Planning*, 226, 104511. <https://doi.org/10.1016/j.landurbplan.2022.104511>
- Parry-Jones, W. (1972). *The trade in Lunacy: A study of private madhouses in England in the eighteenth and nineteenth centuries*. Routledge.
- Peschardt, K. K., Stigsdotter, U. K., & Schipperrijn, J. (2016). Identifying features of pocket parks that may be related to health promoting use. *Landscape Research*, 41(1), 79–94. <https://doi.org/10.1080/01426397.2014.894006>

- Pheasant, R. J., Horoshenkov, K. V., & Watts, G. R. (2010). Tranquillity rating prediction tool (TRAPT). *Acoustics Bulletin*, 35, 18–24.
- Pinto, L., Ferreira, C. S., & Pereira, P. (2021). Environmental and socioeconomic factors influencing the use of urban green spaces in Coimbra (Portugal). *Science of the Total Environment*, 792, 148293. <https://doi.org/10.1016/j.scitotenv.2021.148293>
- Poortinga, W., Bird, N., Hallingberg, B., Phillips, R., & Williams, D. (2021). The role of perceived public and private green space in subjective health and wellbeing during and after the first peak of the COVID-19 outbreak. *Landscape and Urban Planning*, 211, 104092. <https://doi.org/10.1016/j.landurbplan.2021.104092>
- Purves, R., Edwardes, A., & Wood, J. (2011). Describing place through user generated content. *First Monday*, 16. <https://doi.org/10.5210/fm.v16i9.3710>
- Rendel, S. (1998). Simon Rendel: An appreciation. *Landscape Research*, 23, 83–88.
- Reyes-Riveros, R., Altamirano, A., De la Barrera, F., Rozas-Vasquez, D., Vieli, L., & Meli, P. (2021). Linking public urban green spaces and human well-being: A systematic review. *Urban Forestry and Urban Greening*, 61, 127105. <https://doi.org/10.1016/j.ufug.2021.127105>
- Russell, J. A., Ward, L. M., & Pratt, G. (1981). Affective quality attributed to environments: A factor analytic study. *Environment and Behavior*, 13(3), 259–288. <https://doi.org/10.1177/0013916581133001>
- Sang, Å. O., Knez, I., Gunnarsson, B., & Hedblom, M. (2016). The effects of naturalness, gender, and age on how urban green space is perceived and used. *Urban Forestry and Urban Greening*, 18, 268–276. <https://doi.org/10.1016/j.ufug.2016.06.008>
- Tappert, S., Klöti, T., & Drilling, M. (2018). Contested urban green spaces in the compact city: The (re-) negotiation of urban gardening in Swiss cities. *Landscape and Urban Planning*, 170, 69–78. <https://doi.org/10.1016/j.landurbplan.2017.08.016>
- Thomas, A., Owen, D., & Drysdale, S. (2023). Developing a holistic tranquillity assessment method from a soundscape design approach. In *INTER-NOISE and NOISE-CON congress and conference proceedings* (Vol. 265, pp. 2598–2606). Institute of Noise Control Engineering.
- Tieskens, K. F., Van Zanten, B. T., Schulp, C. J., & Verburg, P. H. (2018). Aesthetic appreciation of the cultural landscape through social media: An analysis of revealed preference in the Dutch river landscape. *Landscape and Urban Planning*, 177, 128–137. <https://doi.org/10.1016/j.landurbplan.2018.05.002>
- tranquillity, n. (2023). Oxford English Dictionary. Oxford University Press. <https://doi.org/10.1093/OED/1370442741>
- Tuan, Y.-F. (1974). *Topophilia*. Prentice-Hall.
- Tversky, B., & Hemenway, K. (1983). Categories of environmental scenes. *Cognitive Psychology*, 15(1), 121–149. [https://doi.org/10.1016/0010-0285\(83\)90006-3](https://doi.org/10.1016/0010-0285(83)90006-3)
- Uebel, K., Marselle, M., Dean, A. J., Rhodes, J. R., & Bonn, A. (2021). Urban green space soundscapes and their perceived restorativeness. *People and Nature*, 3, 756–769. <https://doi.org/10.1002/pan3.10215>
- United Nations. (2022). The United Nations sustainable development goals. Retrieved from <https://sdgs.un.org/goals>
- van Putten, S., O'Meara, C., Wartmann, F., Yager, J., Villette, J., Mazzuca, C., Bieling, C., Burenhult, N., Purves, R., & Majid, A. (2020). Conceptualisations of landscape differ across European languages. *PLoS One*, 15(10), e0239858. <https://doi.org/10.1371/journal.pone.0239858>
- Venter, Z. S., Barton, D. N., Gundersen, V., Figari, H., & Nowell, M. S. (2021). Back to nature: Norwegians sustain increased recreational use of urban green space months after the COVID-19 outbreak. *Landscape and Urban Planning*, 214, 104175. <https://doi.org/10.1016/j.landurbplan.2021.104175>
- Wartmann, F. M., Koblet, O., & Purves, R. S. (2021). Assessing experienced tranquillity through natural language processing and landscape ecology measures. *Landscape Ecology*, 36(8), 2347–2365. <https://doi.org/10.1007/s10980-020-01181-8>
- Wartmann, F. M., & Mackaness, W. A. (2020). Describing and mapping where people experience tranquillity. An exploration based on interviews and Flickr photographs. *Landscape Research*, 45(5), 662–681. <https://doi.org/10.1080/01426397.2020.1749250>
- Wartmann, F. M., & Purves, R. S. (2018). Investigating sense of place as a cultural ecosystem service in different landscapes through the lens of language. *Landscape and Urban Planning*, 175, 169–183. <https://doi.org/10.1016/j.landurbplan.2018.03.021>
- Wartmann, F. M., Stride, C., Kienast, F., & Hunziker, M. (2021). Relating landscape ecological metrics with public survey data on perceived landscape quality and place attachment. *Landscape Ecology*, 36(8), 2367–2393. <https://doi.org/10.1007/s10980-021-01290-y>
- Wartmann, F. M., Tieskens, K. F., van Zanten, B. T., & Verburg, P. H. (2019). Exploring tranquillity experienced in landscapes based on social media. *Applied Geography*, 113, 102112. <https://doi.org/10.1016/j.apgeog.2019.102112>
- Watts, G. R., & Pheasant, R. J. (2013). Factors affecting tranquillity in the countryside. *Applied Acoustics*, 74(9), 1094–1103. <https://doi.org/10.1016/j.apacoust.2013.03.007>
- Watts, G. R., & Pheasant, R. J. (2015). Examining factors contributing to tranquillity in the Scottish Highlands and Dartmoor National Park. *Noise & Vibration Worldwide*, 46(6), 10–17. <https://doi.org/10.1260/0957-4565.46.6.10>
- Watts, G. R., Pheasant, R. J., & Horoshenkov, K. V. (2011). Predicting perceived tranquillity in urban parks and open spaces. *Environment and Planning B: Planning and Design*, 38(4), 585–594. <https://doi.org/10.1068/b36131>

- Watts, G. R., Pheasant, R. J., Horoshenkov, K. V., & Ragonese, L. (2009). Measurement and subjective assessment of water generated sounds. *Acta Acustica united with Acustica*, 95(6), 1032–1039. <https://doi.org/10.3813/aaa.918235>
- White, M. P., Elliott, L. R., Grellier, J., Economou, T., Bell, S., Bratman, G. N., Cirach, M., Gascon, M., Lima, M. L., Löhmus, M., Nieuwenhuijsen, M., Ojala, A., Roiko, A., Schultz, P. W., van den Bosch, M., & Fleming, L. E. (2021). Associations between green/blue spaces and mental health across 18 countries. *Scientific Reports*, 11, 1–12. <https://doi.org/10.1038/s41598-021-87675-0>
- Wolch, J. R., Byrne, J., & Newell, J. P. (2014). Urban green space, public health, and environmental justice: The challenge of making cities 'just green enough'. *Landscape and Urban Planning*, 125, 234–244. <https://doi.org/10.1016/j.landurbplan.2014.01.017>
- Wordsworth, W. (1835). *A guide through the District of the Lakes in the North of England: With a description of the scenery, &c., for the use of tourists and residents*. Hudson and Nicholson.
- World Health Organisation. (2018). Environmental noise guidelines for the European region. *Tech. rep.*, Copenhagen, Denmark. Retrieved from https://www.euro.who.int/__data/assets/pdf_file/0008/383921/noise-guidelines-eng.pdf
- Young, C., Hofmann, M., Frey, D., Moretti, M., & Bauer, N. (2020). Psychological restoration in urban gardens related to garden type, biodiversity and garden-related stress. *Landscape and Urban Planning*, 198, 103777. <https://doi.org/10.1016/j.landurbplan.2020.103777>
- Zhuang, Y. (2021). Temple, Huygens and 'sharawadgi': Tempering the passions to achieve tranquillity. *Studies in the History of Gardens & Designed Landscapes*, 41(4), 288–308. <https://doi.org/10.1080/14601176.2021.2017682>

AUTHOR BIOGRAPHIES

Ross S. Purves is a professor of Geographic Information Science at the Department of Geography, University of Zurich. His research aims to address societally relevant research questions, with the fundamental aim of making theoretical, thematic and methodological contributions to Geographic Information Science. He is particularly interested in developing methods and answering questions through the use of unstructured information, often in the form of text.

Flurina M. Wartmann is a Senior Lecturer in Geography at the University of Aberdeen. Her research interests revolve around the relationship between society and nature, including nature conservation, landscape restoration and rewilding, landscape assessment, cultural landscape values and sense of place. In her research she uses interdisciplinary approaches and a variety of data sources, including interviews, public surveys, social media photographs, digitised text sources and participatory GIS.

How to cite this article: Purves, R. S., & Wartmann, F. M. (2023). Characterising and mapping potential and experienced tranquillity: From a state of mind to a cultural ecosystem service. *Geography Compass*, 17(11), e12726. <https://doi.org/10.1111/gec3.12726>