Defra Science Advisory Council

Landscape quality: A rapid review of the evidence

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1. Introduction

'We will conserve and enhance the beauty of our natural environment, and make sure it can be enjoyed, used by and cared for by everyone'

(HM Government, 2018: 28).

This statement refers to one of the government's 10 goals for its core strategy on environmental policy, the 25 Year Environment Plan (25YEP). Its wording highlights the importance of the aesthetic qualities of the natural environment for the strategy. This emphasis is also reflected throughout the Plan where the term 'beauty' occurs no less than 24 times.[2] To ensure that the progress made towards this goal is covered in Defra's monitoring programme, Defra/SSEG commissioned a Rapid Review of the Evidence, focusing on methods of assessing landscape quality and its aesthetic dimension. The purpose of the Review is to inform the monitoring programme and, more specifically, to contribute a deeper understanding of the notion of 'natural beauty' and related aesthetic qualities and how these are better captured through holistic and engaged approaches to landscape quality and value than through fragmented and inventorial ones. Of the 40 indicators identified by Defra for monitoring the progress towards achieving the goals of the 25YEP, two (H11: Changes in landscape and waterscape character and H14: Engagement in the natural environment) are particularly relevant to the quality of landscapes as appreciated by people and evaluated by experts. These have, therefore, been considered by Defra as determinants of the scope of the Review.

This Review consists of five sections. Following this introduction, Section 2 explores the various meanings of landscape in discourse, including cognate terms such as 'countryside'. Section 3 draws a distinction between two approaches to understanding the value of landscape in the academic literature which we have characterised as the fragmented (in sub-section 3.1) and holistic (in sub-section 3.2) approaches. Section 4 provides an overview of the approaches adopted in policy and practice for landscape quality assessment. Although Section 4 identifies a similar, broad-brush distinction between fragmented and holistic approaches, it shows how these are being drawn together by environmental bodies, such as Natural England, in their attempts to integrate detailed scientific appraisals of landscape qualities with the broader and more holistic nature of public perceptions of landscape quality and value. Section 5 summarises the Review and proposes a number of recommendations.

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[2] There are also four instances of 'beautiful' and four of 'attractive'.

2. Meanings of landscape

Borrowing from a Dutch term for a new genre of countryside painting, landscape entered the English language to, originally, mean 'a picture representing natural inland scenery'; it then evolved to mean: 'a view or prospect of natural inland scenery, such as can be taken in a glance from one point of view' (OED, 1989).[3] This dictionary definition highlights a static and visual interpretation of the term, which is still current in English, and appears to underlie some contemporary landscape studies. By the nineteenth century, the English definition had evolved beyond its origins in fine art to cover 'a tract of land with its distinguishing characteristics and features' (ibid.), still at this time considered the result of mainly natural processes. By the early twentieth century, influenced in the Anglophone world by the work of the American geographer Carl Sauer, the human role in shaping landscapes had become better appreciated. The concept of 'cultural landscapes', which was adopted by the United Nation World Heritage Committee in 1992, influenced the European Landscape Convention's definition of landscape as 'an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors' (Council of Europe, 2000).

The human element is important not only for understanding how landscapes have been shaped historically, but also in appreciating their contemporary social value. Landscape is recognised in the European Landscape Convention, of which the UK government has been a ratified signatory since 2007, as 'an essential component of people's surroundings, an expression of the diversity of their shared cultural and natural heritage, and a foundation of their identity'. Going beyond this, various studies in recent decades have attempted to draw links between positive landscape qualities and human preference and wellbeing (described and cited in Selman and Swanwick, 2010). Furthermore, a major contribution to landscape upkeep and enhancement comes from the public purse which makes public perceptions even more important to evaluations of landscape quality and change (Moore-Colyer and Scott, 2005).

While the term 'landscape' has been adopted in international, European and national policy, with the meanings outlined above, everyday discourse might talk about the natural environment in cognate terms, such as countryside, rural areas, or natural heritage.[4] In particular, the term countryside, defined in the dictionary as 'the land and scenery of a country' (OED, 1993), is helpful in indicating a bigger scale of natural space while avoiding the purely visual interpretation that is always a possibility for 'landscape'.

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[3] It has been argued that an implicit social dimension exits within the Dutch/Germanic notion of landscape prior to its adoption into English with mainly scenic connotations. Olwig (1996, 2005) notes that the original German word, Landschaft, implied a territorial polity, entailing certain rights and duties for those living within its bounds. Setten (2003) gives more detail on the social and historical context in which the word gained currency in Nordic areas.

[4] The interchangeability of the term landscape with terms such as 'nature', 'countryside', 'place' and 'environment' are discussed in Swanwick (2009: S63). Natural England (2009) also reports that people use landscape and countryside interchangeably.

Landscape has two further meanings. First, it has a particular meaning in conservation biology/ ecology - connecting a multi-habitat / system approach to joined-up conservation (through spatial elements such as patches and corridors) (e.g. Forman and Godron, 1986). Second, it has a metaphorical meaning[5], as an alternative term for 'surroundings' or 'environs' (the latter is the French root for the term 'environment'). In this very broad sense, landscape can include urban settings or mixed urban and suburban land. In an intermediate approach, much favoured by environmental bodies in the UK, and a feature of the Landscape Character approach (see Section 4 below), landscape includes all kinds of greenspace:

> *Landscape can mean a small patch of urban wasteland as much as a mountain range, and an urban park as much as an expanse of lowland plain. It results from the way that different components of our environment - both natural (the influences of geology, soils, climate, flora and fauna) and cultural (the historical and current impact of land use, settlement, enclosure and other human interventions) - interact together and are perceived by us. People's perceptions turn land into the concept of landscape.* (Swanwick and Land Use Consultants, 2002, cited in Swanwick et al., 2007: 12)*.*

For the purposes of this review, however, we are setting aside these wider meanings in favour of limiting the meaning of landscape to a terrain that is mainly unbuilt-up and with extensive natural[6] elements – rock, water, vegetation – dominating the scene. This fits with the meaning of landscapes in the 25YEP (HM Government, 2018: 4; 56-70)[7] as well as with popular understandings of the term 'natural landscapes', as highlighted in the following statement in a Natural England (NE) study of public perceptions of landscape:

> *Whilst the formal definition of landscape makes clear it is the result of the interplay between natural and cultural (human activity) factors and can exist across rural urban or coastal areas, the term "natural landscape" is used here [...] to represent the perception that people had in considering that landscape is mainly the "natural looking" green, rural or countryside parts of an area, rather than the built up areas.* (NE, 2011: 6).

Studies in North America, Europe and Asia have found that scenes are judged as natural under three conditions: (1) when the landscape is dominated by vegetation, water, and mountains; (2) there are no artificial features or such as exist are obscured; and (3) the dominant contours or visual profiles are curvilinear or irregular as opposed to rectilinear or regular (Ulrich, 1983; Ulrich, 1993; Wohlwill, 1983, all cited in Han, 2003: 211). A

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[5] A 'transferred and figurative use' in the terms of the OED (1989).

[6] By using the terms nature or natural, we do not necessarily suggest the absence of any trace of human influence.

[7] While the word 'green space' is used in the Plan to refer to the wider range of natural areas, including urban parks, allotments and street trees (HM Gov. 2018:16, footnote 1).

noteworthy example is the Chinese word for landscape which is made up of two characters meaning mountains and water.

The question of scale also makes natural landscape qualitatively different from (most) urban green spaces and gardens.[8] Such a landscape is of its nature unbounded, merging with, and being affected by, other types of terrain that we would not describe as landscape – but whose proximity can be important to our evaluation of it (Santayana, 1896; Carlson, 1979). It is hard to say where a landscape begins and ends spatially, or even to fix it temporally, given the continual change it undergoes through the work of humanity, weather, seasons and climate. It has the character of something that we may participate in physically, as well as imaginatively through contemplation. Both as contemplators and participants, we create the landscapes we engage with. According to Terkenli (2001:197) 'we are the landscape', implying that landscape is 'a stage set for human life'. Sometimes landscape beauty is only one aspect of a rich and often social experience of time spent in a natural setting (see sections 3 and 3.2).

Research by Natural England (2009: 23-25) has identified several different scales at which people have valued landscapes, each with a different kind of use:

> *People often had a portfolio of places they would access for different types of experience, including somewhere nearby and easily accessible (such as a local park or riverbank), and somewhere a bit further away but more varied (often a place with a combination of features, such as woodland, fields and a river). Within a character area there would often be special 'spots', the best places to go (such as a special wood, a headland or a high point). These were well known, very popular and contributed significantly towards people's 'sense of place'. People would also have secret places that few people knew about and that provided them with more solitude, or the opportunity for special activities such as bird watching.* (NE, 2009: 5).

In light of this, it should be noted that the extent to which people engage with the kinds of landscapes that are the focus of this Review (and the meaning of the term 'landscape' in the 25YEP), is likely to depend upon where people live in relation to countryside and city, the nature of their personal engagement with landscape, which could be intense or more transactional, and also their time of life, responsibilities towards dependents and physical capacities.   Nevertheless, this Review shows that people have a clear sense of a value of landscapes which is different from their relationship to urban greenspace, parks and gardens:

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[8] The distinction is important for the purpose of this Review while acknowledging that greenspace, including gardens, parks and urban fringe, is included in some expert definitions of landscape. Furthermore, people relate to different scales of natural spaces in different ways. Although outside the scope of this Review, often the most valued greenspaces are the familiar ones that play a role in people's daily lives. The extent of attachments to such familiar landscape is revealed when it is, or perceived to be, under threat (Burgess et al., 1988; Penning-Rowsell and Lowenthal, 1986).

One of the predominant reasons for people saying they needed the 'natural' landscape was to escape their daily lives. Many said they wanted to achieve a sense of freedom, as if they currently felt 'trapped' in some way. Being in a 'natural' landscape gave them a release. Discussions about 'stress-relief' were prevalent, with people needing to 'get perspective' or just 'blow away the cobwebs'. (NE, 2009: 22).

3. Approaches to landscape value and quality

There is a large body of academic and policy and practice literature on landscape value and quality adopting multiple approaches ranging from the more fragmented, static, primarily visual and disengaged analyses that often draw on proxies for the landscape such as photos, satellite images and GIS mapping, to the more holistic, dynamic, multi-sensory and engaged approaches taking into account the presence of the evaluator in the places evaluated. Despite this diversity, it is possible to group this literature into two distinct groups which we have characterised as: the fragmented and disengaged, and the holistic and engaged approaches. Both are explored in detail in the following two sub-sections. While we acknowledge that in practice it may be somewhat artificial to separate these approaches, and both may be valid as ways of apprehending the natural environment, we find the distinction useful for providing a clear framework for the Review, and for highlighting the significance of people's holistic engagement with and experience of landscape and its aesthetic appreciation; an aspect of landscape quality assessment that can be easily left out from extensive and inventorial approaches to monitoring the natural environment.

3.1 Fragmented and disengaged approaches

The Review has identified three distinct ways in which landscape quality has been broken down for the purposes of academic analysis, each focusing on particular aspects of landscape including: the physical features; the abstract visual features; and the psychobiological features, as elaborated in the following three sub-sections. In practice, these may be combined together in specific tools and approaches to landscape evaluation.

3.1.1 Physical features of landscape

The focus on physical features considers the contribution to landscape quality made by natural elements (such as, woodlands and tree cover; field patterns and boundary types; agricultural land use; geological/rock features) and built structures (such as, buildings, historic environment, roads and energy infrastructure). Arthur et al. (1977) described these as the 'descriptive inventory approach' in an early review of scenic assessments.

Many studies have attempted to pick out a number of physical elements that make it either more likely for a scene to be judged positively, or that are associated with positive judgements from particular types of observer such as: lay verses expert observers, or

urban versus rural dwellers. Below we explore the most important of such elements, taking into consideration how these may change over time, and the research connecting them to positive landscape evaluations.

Vegetation

Vegetation is a normal component of landscape in temperate zones. There is extensive evidence for the importance of diverse habitats and greenery in positive landscape evaluations (Kaplan, 1987; Kaplan and Kaplan, 1989). While the inherent biodiversity within a landscape's vegetation is not a predictor of aesthetic preferences (e.g. Gobster et al., 2007), Nassauer (2002) concludes that aesthetic preference may lead people to impute superior ecological values in the land.

Some research suggests that prior knowledge, for example, from working as a farmer, or as an ecological scientist, changes the way we see and interpret vegetation (e.g. Burton, 2012; see also 'scale and openness' below; and 'naturalness and wildness' in Section 3.2.3). Likewise, the way people value the 'ecosystem services'[9] offered by a landscape with varied types of vegetation is affected by factors such as a previous relationship with agriculture, rural/urban origin and identity, environmental awareness, and cultural attachment to a place (Lopez-Santiago et al., 2014).

Some studies have noted the importance for evaluation of landscape quality of being able to pick out single trees or groups of trees, of characteristic tree types and of evergreen and deciduous trees (Parsons and Daniel, 2002; Fry and Herlin, 1997; Lamb and Purcell, 1990). An early study noted how the public's evaluation of landscape trees may differ from that of professionals, showing how the public rated diseased trees as more picturesque and thus preferable to more "healthy" trees (Cook, 1972, cited in Arthur et al., 1977). Seasonal tree colour is also important for aesthetic valuation (Lindemann-Matthies and Bose, 2007; Junge et al., 2015; various cited in Pierskalla et al., 2016) and links with 'colour and tone' in section 3.1.2.

Woodland, arable, grazing and scrub

The pattern of cultivated and forested land, rough pasture and wasteland or scrub is the strongest indication of human influence on the landscape. Woodland is generally a long-term and stable use of the land, based on the time it takes for forests to mature as well as the impacts of some types of trees on soil characteristics. Landscape assessments

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[9] The Joint Nature Conservation Committee, a statutory advisor to the UK government and devolved administrations, defines ecosystems services as: 'the benefits people obtain from ecosystems' (JNCC, 2014). The approach is now relatively well-known, deriving from the UN's Millennium Ecosystem Assessment, undertaken in the UK in 2009 and reported in 2011. The concept has been used to raise awareness of the importance of taking natural systems into account with the general public and with policy makers (e.g. Defra, 2010/15) and breaks environmental services down into four components: supporting, provisioning, regulating and cultural services.

commonly pick out woodlands as distinctive features (Herzog and Bosley, 1992; Legge-Smith et al., 2012).

The impacts of crops on the landscape can be perceived negatively as well as positively. For example, in the UK's recent past, there has been popular resistance to what was seen as the incursion of unnaturally strong colour in the landscape through the widespread cultivation of bright yellow oilseed rape for a variety of uses including cattle feed, biofuel and cooking oil (Blythman, 2007). By contrast, other relatively new crops, such as the cultivation of flowers for biodegradable petal confetti, can receive instant acceptance for adding bright colour, and even develop into a visitor attraction (Daily Mail, 2011). The increasing conversion of fields to growing maize, (a less sweet version of sweetcorn), for animal feed and, increasingly, as a feedstock for anaerobic digestion, has reduced road-side views of landscape due to its height. It has also contributed to soil degradation through creating more sediment run-off, (thus muddier autumn roads), due to a comparatively late harvesting period (ADAS and Ricardo Energy and Environment, 2016).

Currently around seventy percent of the England landmass is used for farming, with arable land found mostly in lower-lying areas. Arable land reveals most clearly changing demands for particular crops, for cloth, medicines, oils, vegetables, biofuels and flowers. Crops once dominant have almost completely died out, at least at a local level. An interesting example is hemp. Pavord (2016: 180) cites an old tithe map of her parish which shows the historic dominance of hemp in her parish for net-making in a nearby fishing village. Due to the recent development of strains low in cannabinoids, thus unattractive to users of recreational drugs, hemp crops are again flourishing in other parts of rural Britain to furnish the raw material for specialist paper and canvas, as well as oil and seeds for the health food industry (Eden Project, undated).

Boundaries and edging

Boundaries such as hedgerows, hedgerow trees and stonewalls are considered as important features of landscape character (LUC and Julie Martin Associates, 2013). As well as providing patterning, field boundaries, which are made up of different living and inanimate materials or combinations of the two, vary depending on local materials and skills. They, thus, provide an instant location cue, and give a unifying character to regional landscapes.

In 1990, the Countryside Survey[10], using satellite mapping and field surveys, picked out a feature that had begun to raise public concern a decade earlier: the reduction in hedgerows. It showed a twenty percent loss across the UK in response to an EU policy

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[10] The Countryside Survey for the UK has run intermittently since 1978 with the most recent one taking place in 2007. There has been no successor as such, although the UK-SCAPE five-year study of 'UK status, change and projections of the environment' (launched in December 2018) will explore pressures on the UK environment arising from various pressures including land use change, and allow researchers to answer high-level questions relating to the environment (https://www.ceh.ac.uk/ukscape).

which paid subsidy for land by area. The findings from the Survey influenced the introduction of Hedgerows Regulations in 1997 and by the time of the 2000 Survey, there was no further significant loss of hedgerows (CEH, undated). This is significant because the linear features of the landscape are not only important reserves of biodiversity, but major visual cues in a landscape, that can pattern and make intelligible otherwise featureless expanses of land.

Boundary stone walls, which have been present for longer in the landscape than hedgerows, were also under threat at some points in recent agricultural history (Barr et al., 1986). A recent case has been made for considering the ecological contribution of stone (as well as hedgerow) boundaries (Collier, 2013).

Water

Due to its reflective surface, still water in pools and lakes generally has a magnifying effect on the ambient mood and colours of the surrounding land and sky. Water features in a landscape have been shown to have a positive impact on landscape quality ratings, compared with landscapes with no water (Kaltenborn and Bjerke, 2002; Nasar and Li, 2004; Volker and Kistemann, 2011; Garcia-Llorente et al., 2012; Yang et al., 2014). There is also consistency in the positive valuation of coastal views (Wheeler et al., 2012). Howley's large study in Ireland found that the general public have the strongest preference for landscape with water-related features as its dominant attribute; supporting two previous studies that are cited in the work (Howley, 2011: 166).

Geology

Most visible when devoid of vegetation due to height, erosion or type of rock, geology in the landscape is most commonly related to the aesthetic response of awe, or the experience of the sublime – see section 3.2.3. Some landscape features, such as gorges, scree escarpments and the upper parts of mountain ranges, are dominated by rock-forms, and yet are found of aesthetic value by many (Wu et al., 2006; Garcia-Llorente et al., 2012). The widespread enjoyment of rocky and mountainous landscapes casts some doubt on the tenets of a psycho-biological account of landscape appreciation (see Section 3.1.3 below).

Built features

While some built features are generally viewed as enhancing the landscape, others are seen as spoiling it. We explore these in further detail below.

The kinds of built features that are often viewed positively include, for example, traditional buildings, churches, castles and standing stones and earthworks, often with connection to cultural and heritage values. In rural newbuilds, traditional countryside styles and building materials are often seen as valued elements, and the UK planning system has long attempted to resist the imposition in rural areas of uncharacteristic styles, materials and

sizes of built structure, although with varying degrees of success. Appearing to support this approach, Sowinska-Swierkosz found that:

> *The intensity of human activities does not have to negatively affect landscape harmony – its impact depends on the coherence with landscape type and the quality of man-made objects.* (Sowinska-Swierkosz, 2016: 177).

Coherence with the scene is not, however, obligatory. In the eighteenth century, when the beauty of static painted views was the model to emulate in designing formal parks, features such as artificial classical bridges and temples, follies, ruins and earthworks, were routinely added to create variety and incident in a natural scene. This practice to some extent persists in privately and publicly-commissioned landscape artworks, which are permitted to inject notes of modernity, incongruity and surprise to particular types of landscape, such as those reclaimed from the extraction industry, or aiming to increase national profile for tourism (e.g. Striding Arches in Dumfriesshire, the Singing Ringing Tree in Lancashire, or Northumberlandia, the Lady of the North, in Northumberland).

The kinds of built structures which are often viewed negatively include features such as modern buildings and roads and large energy infrastructure. These are often described as human material encroachment, associated with negative impacts on perception of landscape quality (Brush et al., 2000; Rechtman, 2013); or as part of a larger category of 'disturbance' (Tveit et al., 2006) which also includes natural disturbances. Even more traditional, meandering and tree-lined roads may engender negative perceptions if these feature heavy traffic. Similarly, utilitarian and temporary farm buildings made of unnatural materials such as metal or plastics are often seen as spoiling the landscape. The perception of encroachments by built features is sometimes extended to include particular ways of farming the land – ones that make it overly homogenous (Iles and Swanwick, 1988; Howley et al., 2012). For W.G Hoskins, who wrote the very first comprehensive history of the English landscape in 1955, 'every single change in the English landscape since the beginning of the Great War has either uglified it, or destroyed its meaning, or both' (Hoskins, 1955: 231).

When it comes to industrial buildings, older instances are increasingly appreciated as Industrial Architecture (e.g. Pearson, 2016). However, through much of the last three hundred years, the popular response to industrial structures in countryside settings has been broadly hostile (e.g. Moore-Colyer and Scott, 2005). The most recent instance of this is the controversy over wind farms (Layne, 2018). Since the introduction of the first commercial onshore windfarm in 1991, turbines have gradually become a pervasive feature of the countryside, with 1,500 farms and a total of 7,175 turbines in the UK at the time of writing (Renewable UK, 2018). Much of the debate is centred on what is perceived as the negative aesthetic impact of turbines, and is conducted in apparent ignorance that there has always been a trade-off between the countryside as provider of primary resources, and the countryside as a place of respite and repose. Before wind turbines, many of the same arguments were used against electricity pylons. In both cases, movements to design a more beautiful or harmonious structure have produced elegant and aesthetic solutions (e.g. LAGI, 2018) which have nevertheless failed to have much

impact on the mass-produced product that most people see and live with. However, in line with the way pylons cease to raise much controversy, recent research indicates that rural people may come to accept and recognise windfarms as a part of the landscape, even when they had been initially opposed to them (Wheeler, 2017).

As noted by Cassatella and Voghera (2011) the natural and environmental elements of landscape are most likely to be favoured or emphasized in landscape monitoring indicators in Northern Europe, while there is more emphasis on historical and cultural aspects in Mediterranean contexts. Both approaches are included in the landscape monitoring in relation to Environmental Stewardship funds (LUC and Julie Martin Associates, 2013), as discussed in Section 4, below.

3.1.2 Abstract visual features of landscape

The approach based on abstract visual features - which may be combined with the physical features approach described above - includes categories such as: coherence and harmony; variation and homogeneity; colour and tone; texture and detail; and pattern and form, as described in detail below. In this approach landscape quality evaluation is closest to the pictorial interpretation of landscape. Indeed, a standard method for testing relationships between visual aspects and positive evaluations is to use photographs or virtual digital replications as proxies for the actual landscapes (Swanwick, 2009). Arthur et al. (1977) described the abstract visual features approach as a subtype of the descriptive inventory, although they considered it less prone to quantification than the physical features approach described in the previous section.

The abstract visual elements are conventionally favoured by landscape designers and architects in landscape evaluation. While in the mid to late twentieth century such judgements were largely qualitative, in recent years, with the rise in mapping tools and computerised visual analysis, there have been increasing attempts to translate them into measurable properties in quantitative research.

Coherence and unity

Following Kaplan and Kaplan (1989), along with complexity, legibility and mystery, coherence is often considered as one of the four fundamental components of landscape appreciation (Sowinska-Swierkosz, 2016). Coeterier (1996) summarizing two decades of landscape research in the Netherlands, found 'unity' to be one of the two most important components of inhabitants' landscape perception and evaluation across types of landscape (the other was 'use'). He however, makes a distinction between unity and coherence:

> *Unity is insufficiently covered by the term coherence. Coherence is an attribute of the parts, whereas unity refers to new attributes the parts do not possess.* (Coeterier, 1996: 31).

Van Mansvelt et al. (1998), in an investigation of farming landscapes, break landscape coherence down into subtypes: vertical coherence (the correspondence between the abiotic environmental conditions and the presence of biodiversity); horizontal coherence (visual appearances matching functions); and coherence of colours and forms. Tveit et al.'s nine-part categorisation of key concepts in analysing landscape mentions patterning together with the abstract quality of texture (discussed below), as key part of the concept of coherence: "we define coherence as a reflection of the unity of a scene, where coherence may be enhanced through repeating patterns of colour and texture" (Tveit et al., 2006: 239).

Variation and homogeneity

Several studies have supported the positive value of variety. An idea which dates back to the writings of Frances Hutcheson in the eighteenth century, and was taken up by artists including Hogarth and Coleridge, is that beauty 'consists in' unity in variety. According to this view, when presented through some integrating structure, variation in a landscape is of its nature attractive and pleasing. This contrasts with the featurelessness and repetitiveness of the homogeneous, or the chaos of disorganised variety (Brady, 2011; Fathi and Masnavi, 2014).

In recent studies, a parallel has been drawn between visual and biological variation, in the form of biodiversity. While it is acknowledged that the two are not identical, it is suggested that a visually varied landscape can be a proxy for a biologically varied one.

Variation may relate to the abstract perceptual qualities explored in this subsection, but could also be conceptualised in terms of the diversity of landscape elements or types of landcover of the preceding section (see De la Fuente de Val et al., 2006; Hunsaker et al., 1994). In their analysis of landscape images shared on social media, Tieskens et al. (2018) found landscape variation to be one of the main determinants of landscape preference; a finding that they note to be supported by many other stated preference studies (e.g. Ode et al., 2009; Pinto-Correia et al. 2011; Sayadi, et al., 2009).

Colour and Tone

Colour variety has been found to influence landscape quality ratings positively (Howley et al., 2012; Schüpbach et al., 2016). In a study of Shanghai Botanical Garden, the researchers asked visitors to evaluate major plants on the basis of colour, size, scent and overall satisfaction. They found colour to be one of the most important factors affecting visitors' overall satisfaction with vegetation (Qin et al., 2013). Sowinska-Swierkosz (2016), applying a new tool for measuring landscape harmony and disharmony, found evidence of the strong impact of colour balance on the perception of landscape unity, backing up a similar finding in earlier research (Clay and Smidt, 2004; Han et al., 2011; Rosley and Rahman, 2013).

At least in temperate zones, the green colour of vegetation is a normal component of landscape and has been associated with a number of beneficial health and mental health

effects (Akers et al., 2012; Gil and Le Bigot, 2014). The exact chromatic tone of green grass and other vegetation is influenced by factors that include the variety of plant, time of year and levels of moisture, but also the properties of the 'terroir' – that is, the minerals and nutrients in the soil and the soil's own colour. Grose has argued that vegetation colour in this sense is an important aspect of conservation "if a local green is replaced by a non-local green, our sense of place is altered" (Grose, 2012: 159). In this respect, the colours and tone of the landscape may subliminally influence the observer's sense of whether they are looking at a familiar or a distant, unfamiliar landscape (described as the 'colourscape' by Lancaster, 1996). Colour in natural scenes also has a strong temporal element, linking us to the time of year, as described in section 3.2.2 below.

Texture and detail

Texture and detail are the features that most closely tie the perceptual properties of a view to its underpinnings in concrete entities. Textures and details mediate between appearance and identification, by providing a structuring pattern and clues as to distance, while suggesting the sensory properties of things seen – light/heavy, rough/smooth, moist/dry. Ulrich's study found that people prefer areas of textural homogeneity or ordered complexity (Ulrich, 1977).

The perceptibility of details from a distance implies good air and an absence of urban pollution, while variety in details and textures indicates opportunities for shifting attention around the scene in a pleasurable manner that has been defined in some environmental studies as "soft fascination" (Kaplan, 1985); described in more detail in section 3.2.4.

Pattern, form and complexity

Borrowing from aesthetic theories from the fine arts, the 'Rule of Thirds' (where a scene has clear patterning into three vertical and three horizontal sections) has been proposed as positively influencing judgments of natural beauty (Zhang et al., 2014). At a more detailed level, the organisation of patterns in space and the variation in the shape and elements of patterns are also seen as important factors in positive evaluations – the key being a combination of complexity and coherence, such as is a feature of natural organisms:

> In natural phenomena there is often also a particular combination of complexity and coherence provided by patterns that repeat at different scales, such as a tree where a branch is similar to the whole tree (Ode et al., 2010: 115).

Complexity appears to influence aesthetic preference positively. Cherem (1973, cited in Arthur et al., 1977: 112), analysing photographs taken by hikers found that, the greater the number of "sense-environmental" changes in a scene, the greater the percentage of hikers who photographed that scene. This is linked with the finding of Gratzer and McDowell (1971, cited ibid: 112) that areas of change in landscapes or 'edges' draw the attention of observers. Kaplan (1973) showed that when landscapes are separated into urban and rural, greater complexity tends to increase preference within categories.

Boundaries and edge features are also important features in patterning, creating 'landscape rooms' (see sub-section 3.1.3 below) which contribute to the intelligibility and navigability of scenery. Patterns can also be provided by non-boundary features, such as patches of colour (see above), or striations in the way a crop is sown or harvested – even in the artificial contouring of land, as can be seen in some remote rural areas, which have conserved or restored the types of strip-farming and lazy-beds (run-rigs) that preceded the dominant enclosed field system of the last 250 years.

Scale and openness

The issue of scale appears in many categorisations of landscape aesthetics but is difficult to pin down. It usually has a primarily visual meaning, relating to the kinds of scalar relationships visible in patterned structures, as suggested by the above quote from Ode et al. It can also relate to notions of sublimity, awe and grandeur, the sense of being overpowered by the size and distance of natural features, as discussed in section 3.2.3. It can also relate to a perspective offering opportunities for freedom of movement, whether or not this is actually available to the observer (i.e. whether the land is publicly accessible or not). In his review of landscape inhabitants' views of their environment, Coeterier (1996) notes that qualities of openness are valued in Northern, but not Southern Netherlands countryside:

> *The appreciation of spaciousness depends on the type of landscape. In the agricultural landscapes in the north of The Netherlands, a large open space is valued positively; it gives an overview over the land. In those regions, farmers do not wish to have trees around the farm because it obstructs the view of their land. In the small-scale landscapes in the south, the same space would be valued negatively, because it would mean that vegetation has been removed. There, it is the absence of a quality, namely naturalness. A large space is emptiness, something (vegetation) is missing, whereas in the north it is the presence of a quality, namely large vistas.* (Coeterier,1996: 37).

Legibility and mystery

Kaplan (2001) considers legibility, mystery, coherence and complexity as the four most important features of landscape evaluation, and considers familiarity and the nature of people's engagement with the landscape as central to legibility and mystery. These qualities may primarily relate to the viewer/visitor's perspective on unfamiliar landscapes and vistas. However, as found by Coeterier (1996), visual legibility and mystery are almost meaningless to those who work the land or who through physical engagement have become thoroughly familiar with all its nooks and crannies.

3.1.3 Psycho-biological features of landscape

The focus on psycho-biological features seeks to link appreciation of landscape with (unconscious) identification of evolutionary advantage. This family of approaches to landscape appreciation highlights how the perception of beauty directs us to terrains that

will favour our survival. Sometimes described as evolutionary theories, these approaches look for the source of appreciation of landscape in our common evolutionary history, whereby we are unconsciously seeking opportunities to survive and thrive in the landscape presented to us (e.g. Appleton 1975; 1996; Zube 1982). In Appleton's Prospect-Refuge theory, we seek areas to survey for prey and resources and areas from which to conceal ourselves from our quarry and hide from predators. These evolutionary advantages are 'symbolised' by visual cues in the scene, cues that humans are hard-wired to interpret in similar ways.

Kaplan has also regarded landscape appreciation as based on evolutionary advantage, but breaks the component features of natural beauty down into categories that relate to more abstract features of complexity, coherence, mystery and legibility (Kaplan, 2001), some of these covered in the previous section. Kaplan's four landscape features are generally tested through a preference matrix, based on asking people to make judgements using static visual images. Although long dominant in landscape aesthetics, a meta-analysis concluded that this approach did not generate consistent results (Stamps, 2004).

Tveit et al. (2006; Tveit, 2009) adapt the prospect-refuge idea to a more generalised notion centred on delimited units that can be observed in the landscape – 'landscape rooms' – providing a link with some of the thinking in landscape design on pattern and form described in the previous section.

These theories provide a fitting bridge between Sections 3.1 and 3.2, as they have elements of both static, fragmented approach and dynamic, holistic approach to landscape. In the writing of Appleton, the psycho-biological approach has a primarily visual emphasis on the way visible features can symbolise landscape resources - similar to the way the elements in some types of landscape painting are understood to communicate political and metaphysical meanings to their intended audience. Psycho-biological theories, however, also have more dynamic aspects – see the section on Kaplan's notion of 'soft fascination' in section 3.2.4 below, which emphasises the restorative impacts of the movement of the eye and mind through the landscape. Furthermore, they are linked with holistic theories, such as biophilia (the love of humanity for the natural world – Wilson, 1984) and topophilia (the love of humanity for particular places – Tuan, 1974), which lead away from questions of beauty towards broader questions of nature engagement.

3.2 Holistic and engaged approaches

There are a number of problems with the abovementioned fragmented approaches to landscape. First, it is possible to imagine all the criteria for each approach being fully met (the presence of valued physical landscape features; varied colours, textures and patterns; an intelligible landscape patterned with moderately sized landscape rooms, and sheltering places) yet without eliciting positive judgements as to either general or aesthetic quality of landscape. The second problem is in the very fragmentary nature of these approaches which to a greater or lesser degree reduce landscape to a static and visual phenomenon, which does not tally with the embracing, three-dimensional and cultural character of

landscape, or with the holistic and multisensory quality of everyday landscape appraisal and appreciation (Scott, 2002; Moore-Colyer and Scott, 2005; Swanwick, 2009). Nor does it tally with what may be most valuable for well-being in landscape appreciation, that is, its association with drawing positive benefits from nature-connectedness (Zhang et al., 2014).

In response to these shortcomings, a number of studies have highlighted that rather than breaking landscapes into specific features, people tend to make overall judgements of them, such as judgements of beauty, of a sense of order and naturalness. Holistic judgements of this kind may be influenced by prevailing cultural and subcultural norms of beauty and order, but are useful heuristics that help people to organise the sensory and cognitive manifold of embodied experience.

The idea that landscape should be considered as a whole was highlighted in academic debates in the 1970s about the best way to evaluate landscapes, which contrasted a holistic view based on 'subjective' public evaluations with an 'expert' or 'objective' approach, that was mainly quantitative and using the analytical frameworks outlined in section 3.1 above. There may remain some of the original disagreement about the idea of holism that arose at this time: is it about global appreciation of the aesthetic dimensions of a landscape? Or is it about more than what can simply be seen, 'a way of dealing with evaluation of the whole landscape experience' (Swanwick et al., 2007: 14). This latter, we term a holistic, engaged approach to landscape quality which seeks to capture on-site experience of landscape and involves two additional dimensions: a multi-sensory (section 3.2.1) and a dynamic (section 3.2.2) appreciation of landscape. Beyond the senses, different kinds of cognition also enter into people's judgements of scenery (section 3.2.4).

3.2.1 Multi-sensory appreciation of landscape

The importance of a multi-sensory engagement in the aesthetic appreciation of landscape has long been recognised by philosophers such as Dewey and Carlson. For example, in his foundational work on aesthetics, Dewey noted:

> *To grasp the sources of aesthetic experience it is necessary to have recourse to animal life below the human scale .... The live animal is fully present, all there, in all of its actions: its wary glances, its sharp sniffing, its abrupt cocking of the ears. All senses are equally on the* qui vive. (Dewey, 1958, cited in Carlson, 1979: 272).

In parallel, urban theories and policies have increasingly highlighted people's emotions and experiences influenced by different sensory cues such as sounds, smells and colours; these are shown to be important for making places that are valued (Anderson and Smith, 2001; Davidson, Bondi and Smith, 2005). Influenced by these theories, a body of work has emerged on the role of sound, smell, taste and touch in landscape experience and evaluation. While attempts are made to study such multi-sensory experience of landscape, using public participatory methods, their contributions have remained tangential to experts' evaluation of landscape. This is despite studies showing sound and smell are important components of people's experience of landscape. For example, the thrum of crickets can be an integral part of the beauty of a summer meadow, while the absence of birdsong is

sometimes found disturbing and even unpleasant in a landscape. Some researchers have even argued that feet, ears and skin are more fundamental to our appreciation of landscape / environment than the eyes (Evans and Jones, 2011; Lee and Ingold, 2006).

Below we explore the role of different senses in people's judgments about landscape.

Sound

Fisher (1998) has noted that it is unsurprising that the role of sound has been largely overlooked in landscape aesthetics research. He argues that the loud and ambient noise of cities has accustomed us to routinely reduce our attention or screen out sound; music is the special category of sound in Western culture to which we are accustomed to give our focused attention. The same may hold for natural environments: research in US National Parks suggests that while anthropogenic sound (such as human voices, aircraft or road traffic) is detrimental to aesthetic and affective environmental assessments of landscape, natural sounds made little, positive or negative, impact on these (Benfield et al., 2010). However, Sowinska-Swierkosz and Chemielewski (2016), in a study that compared expert and lay evaluations of landscape, found that sound and smell were important positive components of their research subjects' experience of their local landscapes, one that had been overlooked by the experts.

Prior (2017) has reviewed the many studies which explore what kinds of sounds enhance or diminish the experience of natural environments. Perhaps unsurprisingly, the general finding is that natural sounds are preferred. Anthropogenic 'noise', including air and ground traffic but also human voices, reduce the perceived serenity of the environment. However, Prior challenges the tendency to limit research only to questions of what is pleasing and displeasing in 'soundscapes' as over-generalised and tending towards the suppression of sound. Not only is this troubling from an ecological perspective, but also from the perspective of improving understanding of what kinds of soundscape could be significant for landscape quality:

> *Clearly, many landscape sounds resist being easily categorised as either bringing about pleasure or displeasure, meaning that these sounds are under-represented (if not completely ignored), and so remain under-theorised within research* (Prior, 2017: 10).

A more holistic approach to research on the senses in landscape appreciation, that links them to aspects such as 'coherence' with the other sensory and cognitive information presented by the environment, could enhance the relevance and value of such research.

Smell and taste

Porteous (1985), who is a foundational exponent of the importance of a multi-sensory approach to the environment, notes that in some cities "one can taste the air" and surely the same can be said for some landscapes, at certain times of the year. Porteous's early work on olfactory environments has been followed by occasional studies including or

focusing on the role of smells in the environment (e.g., Coeterier, 1996; Henshaw, 2013; and Xiao et al., 2018).

Coeterier (1996: 38) explores a range of sensory qualities in natural environments and finds that landscape inhabitants are able to identify their landscape by its characteristic set of sensory qualities and that 'smells especially play an important role in this respect'. Xiao et al.'s (2018: 111, 113) study represents something of a breakthrough, in showing the appropriateness and contextual relevance of a smell as a factor in the way that the smell is evaluated. As with sounds, research on the impact of smell on landscape evaluation can benefit from going beyond the qualities of the smell itself to consider questions of congruity or incongruity with the surroundings.

Touch, thermoception, mechanoception and proprioception

One classic way to highlight the importance of touch in landscape appreciation is to draw attention to the experience of the blind: "we should not underestimate the significance of touch, above all to blind people, for whom it opens up the possibility of access to the landscape - if only through proximate bodily contact" (Ingold, 1993: 163). Topophilia theory also allows for the haptic side of our experience with nature:

> *An adult must learn to be yielding and careless like a child if he were to enjoy nature polymorphously. He needs to slip into old clothes so that he could feel free to stretch out on the hay beside the brook and bathe in a meld of physical sensations: the smell of the hay and of horse dung; the warmth of the ground, its hard and soft contours; the warmth of the sun tempered by breeze; the tickling of an ant making its way up the calf of his leg; the play of shifting leaf shadows on his face; the sound of water over the pebbles and boulders, the sound of cicadas and distant traffic. Such an environment might break all the formal rules of euphony and aesthetics, substituting confusion for order, and yet be wholly satisfying.* (Tuan, 1974: 96).

The understanding of human senses has expanded beyond the conventional idea of touch to include a range of diffuse perceptions, not associated with a single organ as such, such as the ability to sense ambient heat and vibrations, as well as our own body's movement, temperature, and wellbeing. But this is ahead of most landscape research, although the academic literature on walking is particularly adept at capturing the kinaesthetic aspects of landscape. Whyte (2015) notes the range of disciplines that have explored the experience of walking out of doors, including cultural geography, nature writing, anthropology, landscape archaeology and even philosophy. In A Philosophy of Walking, Gros (2015: 20) states, "Think while walking, walk while thinking, … as the body on a walk rests in contemplation of wide open spaces".

McPherson (2016) emphasises how different the experience of walking in landscape can be, dependent on individual attributes, levels of fitness, age and so on. Some of the haptic and kinaesthetic aspects of outdoor experience are explored by Evans and Jones (2011) in considering the research method of 'the walking interview'. Lee and Ingold (2006) go as

far as to describe feet, ears and skin as more fundamental to how the environment is perceived than the eyes.

3.2.2 Dynamic experience in landscape

The second dimension of the holistic and engaged approach is the role of dynamic or temporal experience in landscape quality. The dynamic aspects of landscape – from the experience of one's own body moving through terrain to observations of animals, birds and insects, as well as the forces of clouds, wind and rain – are more likely to emerge from an immersive and engaged relationship to countryside. Dynamic aspects seem central to popular understandings of 'nature' and 'natural environment' (e.g. Central Office of Information et al., 2007, reproduced in Swanwick, 2009).

On a slower timescale, however, the temporality of a cultural landscape is profoundly human and social – what Ingold (1993) calls a 'taskscape'. This is a meaning that is most apparent to those who dwell in and work the land, and to those who study how it has been shaped by human actors (e.g. archaeologists), while it may perhaps be less visible to occasional visitors. We should not therefore 'treat landscape as an object if it is to be understood. It is a living process; it makes men; it is made by them' (Inglis, 1977: 489); 'we are the landscape' (Terkenli, 2001). Just as with music, the forms of the landscape are generated in movement. This is a time-lapse kind of dynamism, imperceptible to the eye and felt (rather than seen). As Bender puts it:

> **Landscape is time materialized**. Or, better, **Landscape is time materializing**: *landscapes, like time, never stand still.* (Emphasis in source, Bender, 2002: S103).

Below, we discuss three aspects of dynamic engagement and also touch upon some of the changes in the dynamic experience of landscape over time:

•   the serial and changing experiences of moving around and through the landscape

•   the multi-sensory experience of living things moving through the landscape

•   temporality and inanimate forces moving through the landscape.

In practice the engaged experience is a function of all three combined.

Moving around

New techniques such as computer simulation and virtual reality have allowed researchers to capture the three-dimensional aspect of landscape vision in controlled conditions (e.g. Bishop and Rohrmann, 2003; Brush et al., 2000). Recent research in the field has gone further in considering the eye as attached to a mobile, active human subject, which will gain greater aesthetic enjoyment, the greater the extent and range of views it has of a landscape (Swetnam et al., 2017). These authors

break landscape quality down into two components: a Visual Quality Index (VQI) and a viewshed model to calculate a Zone of Visual Influence (ZVI) and argue that, "By combining the VQI and the ZVI, we capture two elements: firstly the intrinsic landscape quality (its aesthetics) and secondly, how much of the landscape can be seen by the public in order to enjoy the view." (ibid.: 451).

Taking this insight even further some studies are interested in the experience of moment-by-moment progress through a landscape, in active motion such as walking or cycling, and how this relates to overall evaluation of the landscape experience (Pierskalla et al., 2016). This research has used the capacity of feedback devices (continuous audience response technology, or CART) to allow subjects to relay their estimation of landscape quality as they hike through a terrain, known as the Experience Sampling Method, because it measures human experience over time (Havitz and Mannell, 2005). The study found that moment-by-moment estimations are higher than retrospective, summative ratings, and the element most closely related to positive scenic evaluations was variety of perceptual experiences (Pierskalla et al., 2016).

Living things

Living things, like livestock, birds and dragonflies, vary with the agricultural calendar, and the seasons. Moving through a landscape, they provide interest and unpredictability while highlighting distances and undulations.

Livestock and Wildlife - The distinction between these two categories is somewhat blurred in England[11] and they are sometimes picked out alongside the term 'animals', but the key is their importance in public's understanding of the terms 'nature', 'natural environment' and 'natural beauty' (Swanwick, 2009; Selman and Swanwick, 2010). One of the earliest writers on rural England, William Cobbett, often notes the movement of rooks and sheep in the landscape.[12]

> *The flocks of sheep, some in fold and some at large, feeding on the sides of the hills, give great additional beauty to the scenery.—The woods, which consist chiefly of oak thinly intermixed with ash, and well set with underwood of ash and hazle [sic], but mostly the latter, are very beautiful. They sometimes stretch along the top and sides of hills for miles together; and as their edges, or outsides, joining the fields and the downs, go winding and twisting about, and as the fields and downs are naked of trees, the sight altogether is very pretty.—The trees in the deep and long valleys, especially the Elm and the Ash, are very fine and very lofty; and from distance to*

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[11] Several common wild mammals in England were originally introduced as livestock, including rabbits and some breeds of deer. Distinctions are likely to be further blurred through a move towards re-introducing deer as a farmed animal, based on the relatively lean and healthy properties of venison compared with other kinds of meat

[12] The way rooks and sheep tend to feature in Cobbett's favourite landscapes was noted by Pavord, 2016: 124.

distance, the Rooks have made them their habitation. Hurstbourne Tarrant, Hants, Nov 4th, Sunday. (Cobbett, 1826).

Due to changes in methods of husbandry, pigs are probably less visible than in Cobbett's time but there is today greater variety in breeds of sheep, more cattle and goats and some exotic new introductions roaming in British fields such as alpaca, lamas and even ostriches. Those tending livestock also take a very different appearance, generally being seated on quad bikes - with or without sheepdog.   Ingold (1993) notes that we should be aware of the performative, interactive relationships of all animate beings – including animals - with landscape, beyond a focus on the human.

> *Outside my window I see a landscape of houses, trees, gardens, a street and pavement. I do not hear any of these things, but I can hear people talking on the pavement, a car passing by,birds singing in the trees, a dog barking somewhere in the distance, and the sound of hammering as a neighbour repairs his garden shed. In short, what I hear is activity, even when its source cannot be seen.* (Ingold, 1993:162).

Birds - Birds are picked out as a separate category in the public's understanding of 'nature' and 'natural environment' (Swanwick, 2009). They are a major factor connecting people to the natural environment: an estimated 6 million people in the UK go birdwatching every two weeks (CBI, 2011, cited in Kronenburg, 2014: 622). The sound of bird calls relates this dynamic quality back to the multi-sensorality of landscape quality (see section 3.2.1). Although certain sounds, such as the call of rooks, are sometimes found harsh, they may be significant for people as being characteristic of the winter landscape in Britain and an enduring feature through history.

The formations taken by birds provide seasonal accents: starlings are less common than they once were, but their spectacular murmurations are still a compelling feature of autumn and winter in some parts of the country. Besides flocks, individual birds in the landscape can also be a season marker – the blue flash of a kingfisher, representing summer or a red-throated robin in winter - often assumed to be a native bird but also sometimes a winter migrant from colder regions (RSPB, undated). The distinctive flying patterns and calls of seasonal migrants such as geese, lapwings and curlews can become strongly associated with landscape as part of a regional identity (Cocker and Mabey, 2005). The absence of birds or of birdsong, by contrast, has come to symbolise a disturbing or even poisoned landscape (as in the poem 'La Belle Dame Sans Merci', by Keats, 1819/1977; see also Rachel Carson's seminal *Silent Spring*, 1962).

Insects -The environmental philosopher David Abrams begins his book (Abrams, 1997: 3-20) on the dependence of cognition on nature connectedness with a consideration of what insects bring to environmental experience. Such phenomena as the hum of crickets or the darting of dragonflies might only be noticed when they are absent, particularly if linked to knowledge of actual decline due to pollution, pesticides and habitat change (McKie, 2018). Although as mentioned in McKie's article, butterflies are an example of 'charismatic' insects, whose absence is likely to be missed, dragonflies appear to enhance enjoyment of

ponds in greenspace, though more so for those with basic dragonfly knowledge (Ngiam et al., 2017). Humbler insects can also become a focus of interest – for example, bees, based on the well-publicised threats to their numbers in recent years; and grasshoppers, also in decline, which connect the current older generation with childhood experience.

Temporality and inanimate forces

Inanimate forces such as clouds, wind and rain, bring mobility and vitality to the elements of vegetation, standing water and rock, while the slower turn of the days and seasons connects the observer to the rotation of the planet and the cycles of the solar system.

Clouds, sunlight and stars – The way that the work of light and time of day on landscape cannot be captured by painting is the theme of Emily Dickinson's poem 'How the Old Mountains Drip with Sunset':

How the old Mountains drip with Sunset

How the Hemlocks burn—

How the Dun Brake is draped in Cinder

By the Wizard Sun— .

(Dickinson, 1862)

Ingold in his work exploring the notion of taskscape - an activity-generated temporality embedded in landscape - notes that:

> *The rhythms of human activities resonate not only with those of other living things but also with a whole host of other rhythmic phenomena - the cycles of day and night and of the seasons, the winds, the tides, and so on.* (Ingold,1993: 163).

To be embodied in landscape is to be linked with nested rhythmical cycles at larger and smaller scales.

Rivers, lakes, coast and sea - Inherently mobile, the varieties of blue space featured prominently in the public's concept of 'nature' and 'natural environment' as shown in research for the 2007 Central Office of Information study, cited in Swanwick (2009). Water flow may be appreciated differently, depending on whether the watercourse is small, such as a stream, or a large river. A high flow and less visible banks are most valued in a small river, whereas a calm and steady intermediate flow with low turbidity is more valued in a large river (Pfluger et al., 2010).

Wind and rain – These have dynamic visual, auditory and haptic dimensions. One of the respondents to Selman and Swanwick's survey on the meaning of 'natural beauty' noted that it "engages all the senses, wind in your face, wetness in your feet" (Selman and Swanwick, 2010). The open sweep of landscape areas and higher land allow for greater connection with currents of air, linking with the multi-sensory aspect of landscape

enjoyment – at least, up to the point of sensory discomfort. The ability to hear the wind and other transitory geophysical sounds such as the sound of rain and waves, is relatively dependent on the type of landscape but relatively independent of the time of day. By contrast, human and biological sounds in landscape are more associated with particular times of day – those when people and animals are active - than with specific types of landscape (Matsinos et al., 2008: 958). The impacts of wind on other elements such as grain crops, trees and clouds provide movement and visual interest in a scene, while sudden changes wrought by severe winds can transform a landscape overnight and allow for new views and openings. Although these are categorised as a type of 'disturbance' in Tveit et al.'s 2006 typology of visual aspects of landscape, the impacts are not always perceived negatively.

Seasons - Some of the earliest poems in the English language that focus on natural scenery describe the changes wrought by the seasons (e.g. Thomson, 1735). Coeterier (1996:37), in his study of landscape inhabitants' perceptions and evaluations of their surroundings, notes that as people have moved away from work related to the land, the seasons determine the flow of daily life less and less. Instead, they mainly influence recreational activities. Some landscapes have become particularly associated with tourism based on seasonal attributes such as snow, leaf-colour or spring wild-flowers such as snowdrops. The best-known example is tours to see the autumn colour in New England.

Seasonal colour changes have been associated with positive evaluations of landscape, for instance spring blossom or autumnal leaf drop (Lindemann-Matthies and Bose, 2007; Junge et al., 2015). Seasonal and temporal impacts were also well evaluated in studies by Buhyoff and Wellman, 1979 and Gramann and Rudis, 1994, cited in Pierskalla et al. (2016: 214).

Climate - On a much slower scale than the seasons, and with far more complex causes, the earth's climate is altering and shifting. Since the acceptance of human impacts on climate, it has become commonplace to distinguish between weather, as temporary and transient meteorological phenomena, and climate, as long-term trends and shifts in both the force and impact of weather events, and average seasonal weather trends. To some extent, ecological history indicates that environmental change is the norm, not the exception (Head, 2000). The impacts of a changing climate on countryside in the UK are becoming more visible, including the unsettling phenomenon of extensive flooding in agricultural fields that is slow to dissipate and the scoured and subsiding river banks left behind after extreme rainfall events. At the other extreme, as seen in some parts of the country in 2018, unprecedented low rainfall and high temperatures can shift the summer landscape colour to rusts and browns, destroying crops and grass (Case, 2018), and leading to higher mortality for some forms of wildlife, although benefits for others (Ashton, 2018).

3.2.3 Perceptual judgments of landscape

Holistic judgements of perception claim to recognise abstract, global qualities in countryside scenes and are favoured in popular discourse on landscape appreciation.

Some researchers claim that these judgements - of beauty, wildness, sense of order or sublimity and so on (discussed in detail below) have their origins in the elite philosophical and religious discourse of the 18th century but since have 'trickled down' to achieve more widespread adoption (Mitchell, 1994/2002). It is, however, equally possible that both the elite and popular terms reflect a common impulse towards orientation, connection and appraisal, driven by the complex sensory and cognitive responses evoked in large-scale natural territories.

Beauty

The term 'natural beauty' was enshrined in the National Parks and Access to the Countryside Act 1949 when a Romantic idea of scenic value still prevailed and before the systematic study of landscape history and ecology. While subsequent changes to the legislation have made it clear that natural beauty is not just scenery but includes landform and geology, plants and animals, the historic environment and cultural heritage, the term 'beauty' is still used by people to express their overall judgement / appreciation of landscapes (Scott, 2002; Swanwick, 2009). This enmeshing of the idea of beauty with the various environmental, cultural and historical dimensions of a place is conveyed in one of the ten goals of the 25YEP (as mentioned in the opening of this Review) which focuses on 'Enhancing beauty, heritage and engagement with the natural environment', partly by "safeguarding and enhancing the beauty of our natural scenery and improving its environmental value while being sensitive to considerations of its heritage" (Defra, 2019: 28).

When philosophers began to turn their attention to the concept of beauty in the eighteenth century, they were focused on the natural world, including living organisms such as birds and sea creatures (Immanuel Kant), and landscapes and scenery (Frances Hutcheson and Joseph Addison). For Kant, beauty was an entirely different order of judgement than what he called the judgement of taste that is finding something to be agreeable (Berger, 2009). There was also a subcategory of the beautiful which was developed as particularly appropriate for the enjoyment of landscape, the picturesque – 'that peculiar kind of beauty, which is agreeable in a picture' (Gilpin, 1792). Despite these early developments, landscapes have proven difficult subjects for philosophical reflection in the way they merge with, and are affected by, other kinds of terrain that we would not describe as landscape – but whose proximity can be important to our evaluation of them (as noted by Santayana, 1896 and Carlson, 1979). As noted earlier, it is hard to say where a landscape begins and ends spatially, or even to fix it temporally. Given the elusiveness of landscape, it is perhaps unsurprising that later development of aesthetics moved away from landscape to centre on the much more defined and static subject of artworks.

Paradoxically, for fine artists themselves, during the course of the 20th century, the very idea of beauty became problematic (Herrington, 2016). The reasons for this are complicated but may relate to the spotlight thrown by beauty onto the exceptional and the rare, at the expense of more levelling and unifying values that prevail in democracies, particularly during periods of upheaval. This is certainly part of the political critique of the concept of landscape beauty – that it naturalises unequal patterns of land ownership,

including processes of forced enclosure and eviction (e.g. Mitchell, 1994/2002). The result is that up until the last decade, judgements of beauty have felt problematic and contested.

Herrington (2016) traces a revival of interest in beauty as a quality of landscape, art, and landscape art in the past decade. She explores the implications of such revival in the works of, for example, Kirwan (1999); Scarry (1999); McMahon (2007); Nehamas (2007) and Parsons and Carlson (2008) and finds that the perception of beauty draws our attention strongly, but that the judgement of beauty is related to our understanding of function, and subject to modification through factual information. The latter draws on Eaton's (1999:10) notion of 'contextual beauty' illustrated by her through an experience whereby an abundant plant in a wetland landscape can no longer be seen as beautiful once it has been understood to be invasive and destructive of the habitat. The idea of 'contextual beauty' highlights Herrington's point that there is a cognitive dimension to aesthetic judgement, as discussed in section 3.2.4 below. But the attempt to use this as a way to lever concepts of social justice and ecological awareness into the idea of beauty have remained unconvincing given the diversity of people's ecological and social values. As Gobster et al. (2007) found, the landscapes people judge most beautiful are not necessarily the most biodiverse and healthy: there are multiple values at play besides that of ecological fitness.

Since Gilpin's time (mentioned above) the meaning of the word picturesque has shifted to a milder sense of '(sometimes depreciative or ironic) pretty in an old-fashioned or undeveloped way: charming, quaint, unspoilt' (OED Third Edition, March 2006). This shift points to the way in which ideas of beauty, which echo the idealisations of the sacred, become gradually dampened down over time towards the more commonplace and less exalted, even the kitsch. These less exalted terms of aesthetic appreciation – attractive, pleasing, pretty, picturesque – indicate the pervasiveness of an aesthetic attitude which some people are concerned to apply to the decoration and organisation of themselves and their environments. Such terms may be more consensual and unifying and make less strong claims about both the object and the person passing judgement on it, than would be implied by the term 'beauty'.

Sublimity

An even less presumptuous quality adheres to aesthetic terms such as sublimity, grandeur and awe, because they suggest gratification that is derived from the diminishment of the sense of self. Edmund Burke in 1757 was one of the early philosophers who saw the distinction between the beautiful and the sublime as pivotal. He thought that nothing that corresponds to how we would wish it to be is sublime, but rather, the sublime is found in terror, awe, vastness and self-annihilation. Joseph Addison considered an untrammelled view across great distances essential to the experience, while Kant argued for a moral dimension, whereby the awe inspired by the power of the natural world invites us to measure up to it as moral beings (for a discussion of Burke, Addison and Kant's views see Crowther, 1998). The distinction has also been applied to different kinds of art-works: some delight through a presentation of order and harmony, shaped by obedience to

structuring rules, others by a disruption of those rules and by challenging convention and orderliness.

The sharpness of the distinction between the sublime and the beautiful is no longer generally enforced in aesthetics, but there is still recourse to the vocabulary of awe and grandeur to account for the particular aesthetic sensation that derives from a sense of the immensity of natural events and forces as revealed in certain types of landscape. Indeed, Berleant (1992: 234), in his 'aesthetics of engagement' sees an important place for the sublime because it highlights 'the capacity of the natural world to act on so monumental a scale as to exceed our powers of framing and control'.

Sense of order, naturalness, wildness and wilderness

Sense of order - In landscape, a sense of order to some extent relates to the landscape design concepts of 'unity', or 'unity in variety', outlined in Section 3.1.2 above. As a global judgement of the kind made by a non-expert, however, the sense of order might go beyond the harmoniousness of unity in variations of vegetation, rock and water to indicate a perception of balance - between the wild and the cultivated, between the natural and the human made – that might reflect an ideal of the relationship between human and nature.

All of these possibilities and more are present in Tveit et al.'s (2006) nine-part categorisation of 'key concepts for analysing landscape character'. This theory considers the sense of order to be cognate with terms such as unity, harmony and readability, and as amenable for inclusion within the broader concept of 'coherence', a reflection of the correspondence between land use and the natural conditions in an area. However, the sense of order is also included as part of the concept of 'stewardship' – human care for the landscape through active and careful management (Tveit et al., 2006). This fits with Coeterier's (1996: 40) finding in the Netherlands that for the landscape inhabitants, 'coherence or order in the landscape is a matter of course; they often imposed it themselves'.

Naturalness and wildness - Ideas of naturalness and wildness may be thought to provide a counterpoint to increasing awareness of humanity's pervasive influence, and in particular, to provide a place of release from the financialisation of space that is argued to be part of the contemporary urban experience (Rossi, 2017; Enright and Rossi, 2017). However, Moore-Colyer and Scott (2005), in their study for the Welsh LANDMAP initiative[13], found that:

> *One interesting aspect revolves around the perception of 'naturalness' encountered in the responses. It is clear that public perception does not accord with professional interpretations as the term has been used in varying circumstances with reference to heather moorland and intensively managed farmland. It is the authors' contention that such sentiments reflect a highly positive visual response to an 'idyllic'-type*

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[13] A landscape evaluation initiative in Wales which explicitly includes public perceptions.

landscape rather than 'natural' in its strictest sense. (Moore-Colyer and Scott, 2005: 511).

In England it has been traditional to contrast the 'wild' upland areas with the 'garden-like' lowlands, and to see both as essential parts of the English landscape (Cosgrove et al., 1996). However, wildness may be seen differently by people depending on their relationship with the land. A preference for order over wildness appears to characterise the farmers' appreciation of natural beauty, which according to a recent study was due to the farmers' deeper understanding of the relationship of orderliness to productivity. The same agricultural landscapes were generally not rated highly by non-farmers (Arriaza et al., 2004; Howley, 2011), although there was an age effect in Howley's study, whereby agricultural landscape was rated more highly by people in higher age bands. Similarly, water-dominated landscapes were the most highly rated on grounds of aesthetic value, while wild, boggy and marshy lands scored the lowest ratings, except with 'relatively higher social classes', who found more aesthetic value in such places than other groups (Howley, 2011: 167).

Wilderness - Wilderness, on the other hand, is a feature associated more with North American and New World discourse on landscape and describes landscapes of a primeval character with minimal visible human influence. While these can give rise to aesthetic experiences, they are located towards the transcendental and spiritual end of the spectrum (Selman and Swanwick, 2010). A study in the Netherlands and France found images of nature to vary considerably between different types of land users, such as farmers, urban residents, hunters and conservationists in ways that show the way these categories tend to be used exclusively (Bjuis et al., 2006, summarised by Dorning et al.) as follows:

> *an individual's views of landscape can be classed into three categories of human-nature interaction: (1) wild/wilderness, where human influence is, or should be, absent; (2) a functional view where the landscape is seen in utilitarian terms for leisure or extractive use; (3) or an Arcadian view where landscapes are a harmonious interaction between humans and nature.* (Dorning et al., 2017: 74-75).

There has been considerable questioning of ideas of wilderness used in international conservation initiatives, as they are prone to misinterpret a temporary reversion to nature of formerly cultivated areas, and may have the impact of evicting indigenous peoples by failing to recognise or accept their long-term, environmentally light impact. In this sense the term wilderness can impose a new colonisation of territories for western environmentalism, against the interests and rights of local people (Head, 2000; Saunders, 2012).

3.2.4 Cognitive engagement with landscape

As noted in earlier sections, it has long been recognised that cognition has a role to play in landscape evaluation, although this can range from the unfocused free play of 'soft fascination' as suggested by Kaplan (1985) to the central role of cognition in the environmental aesthetics of Allen Carlson. The role of cognition tends to be balanced

against the holistic judgments of beauty, naturalness and order outlined in the previous section.

In the following sub-sections, we focus on the role of scientific (knowledge of ecological status of landscape) and narrative cognition (knowledge of historical and cultural stories about landscape) in people's appreciation of landscape beauty, especially when such knowledge resonates with their value systems. The scientific and cultural distinction is reflected in the understanding of the perception of a sense of place. While the geologist, Seddon, (cited in Grose, 2012: 159) argued for the geological foundations of a sense of place in distinctive regional landform, soils, plants and our responses to them as landscape, Antonsich (2010) takes a more cultural perspective, showing how a sense of place links with personal and social identity and notions such as 'rootedness' in an area.

Scientific knowledge of the natural world

While not one of the senses, cognition is nearly inseparable from perception, and philosophers have debated the interplay between the internal frames and schemas with which we categorise the world, and the cavalcade of perceptions that we experience through those frames, but which can also, to some extent, modify those frames (see for example, the famous Fodor-Churchland debate discussed in Rollins, 1994). The interplay between perception and cognition has been regarded as essential to the experience of beauty by some philosophers. Eaton (1999), as noted in the previous section, describes an example of enjoying the beauty of a wildflower in a wetland scene, until her friend who was expert in wetland ecology, explained that it was a damaging invasive species, after which she was no longer able to find it beautiful. Other studies back up Eaton's self-examination, showing the influence of ecological knowledge on preference for some types of landscape over others (D'Antonio Monz et al, 2012; Gundersen and Frivold, 2011). The environmental aesthetician Allen Carlson sees the cognitive element as equally important to the multisensory engagement in landscape appreciation:

> *If to aesthetically appreciate art we must have knowledge of artistic traditions and styles within those traditions, to aesthetically appreciate nature we must have knowledge of the different environments of nature and of the systems and elements within those environments. In the way in which the art critic and the art historian are well equipped to aesthetically appreciate art, the naturalist and the ecologist are well equipped to aesthetically appreciate nature.* (Carlson, 1979: 273).

However, while scientific knowledge of the natural world can enhance our appreciations of landscape, it is not a necessary condition; we don't need to know why and how a bird signs to enjoy its song.

Historical and cultural knowledge

For some landscape experts, historical understanding is as important as ecological insight. Landscape as a palimpsest of earlier historical epochs is highlighted by the US school of historical geography, notably Carl Sauer, who drew attention to the way that most

landscape has been to a greater or lesser extent shaped by human activity (Sauer, 1925), a finding that informed the UN World Heritage Committee concept of 'cultural landscapes', and influenced the work of W.G Hoskins' study of English landscape history as well as the writings of J.B. Jackson on the meanings of American landscape.

Although critical of changes to the English landscape near to his time of writing (mentioned earlier), Hoskins (1955) relished its capacity to preserve and evoke other historical epochs, believing that it could provide documentation of ways of life where no actual written documents exist, or have ever existed (1955: 235). Sowinska-Swierkosz and Chemielewski (2016) in their study combining expert and lay views on landscape quality found that lay respondents attributed high importance to two elements not present in the experts' proposed indicators – one of these was the multi-sensory aspects of land use (as noted above); the other was historical forms of land use, which they took to imply the importance of historical land use structure as a key factor in landscape evaluation. This is backed up by Coeterier's (1996:42) research on the inhabitants of different landscapes across the Netherlands, although he notes their awareness of the need for landscapes to evolve with the times.

Several accounts break historicity down into component elements. For Tveit et al. (2006) historicity is one of nine key categories within their scheme of landscape analysis. It is composed of two dimensions: historical continuity and historical richness. Continuity implies the visual presence of different time layers, and the age of time layers is also a factor. Historical richness relates to the amount, condition and diversity of cultural elements. Similarly, the English Heritage Historic Landscapes Project found three historical dimensions, namely: historical process, timedepth and complexity/diversity (Fairclough et al., 1999).

For the horticulturalist Anna Pavord, the discernment of human traces in the landscape is central to its appreciation: "Our landscape is full of ghosts, of hands that have twitched and pulled it into sheep runs and cattle folds, bridleways and burial mounds. It is one of its great strengths" (Pavord, 2016: 40). Her description of beloved landscapes in *Landskipping* points to a more intuitive way of understanding landscape, which might allow in elements from oral tradition and folklore. This could be summarised as a 'narrative' mode of cognition, indicating the way in which we tell ourselves stories about places, perhaps drawing upon some historical or scientific information, but without the historical or scientific drive for knowledge. A 'narrative mode' could link to our culture's main stories about nature. Soule and Lease (1995), for example, identify at least nine distinct cognitive formations of nature in Western thought, including: Magna Mater, Unpredictable and Evil Bully, Ageing and Reluctant Provider, Wild Kingdom, Open-Air Gymnasium, New Age Temple, Wild Other (or Divine Chaos), Gaia and Biodiversity. Narrative also relates to personal history, as described in three different kinds of walks described in Lund (2012). Here the author emphasises the way in which a landscape intertwines with and influences the narrative in a reciprocal process of creation, both forms and is formed by it.

The idea that enjoyment of landscape involves a playful and non-goal directed 'narrative' style of cognition may be reflected in the placement of interpretative panels in scenic areas

by public authorities. These generally give brief and schematic pointers to elements of ecological, historical and folkloric interest in the view, while their brevity implies that acquiring detailed knowledge of the area will not be the main purpose of most people's visit. An implication may be that the play of cognition enjoyed through engagement with landscape might include using some basic pieces of information about a place as a basis for broader imaginings of, for example, other historical periods, hidden species native to the landscape, and other seasons at which one might visit the landscape. The rise of this novel kind of natural history education in Britain since 1960 is charted by Matless et al. (2010).

Soft fascination

This phenomenon links to the information-processing theory of landscape (proposed by Kaplan and Kaplan, 1989), which is often considered a kind of psycho-biological approach given that it relates to the restorative advantage conferred by spending time in nature. Specifically, this theory posits that landscape gives us respite from the directed information processing demands required by observing or carrying out goal-driven behaviours, and supports an undirected play of attention – described as 'soft fascination', that enables a subsequent renewal and restoration of a critical human cognitive function, that is – directed processing capacity (Kaplan, 1985). This theory can accommodate many of the reflections on the nature of cognition in landscape appreciation outlined in the previous section, while also linking back to some of the findings of the positive value of variety and complexity in landscape described in Section 3.1.2. If a detached and contemplative attitude is commonly found with regard to landscape beauty, this must partly relate to questions of scale, placing it beyond ordinary conceptions of an object to be possessed. It also indicates that an engaged and immersive experience of landscape is compatible with, and perhaps interchangeable with, the contemplative gaze.

4. Evaluation and monitoring of landscape quality in practice

This section provides a brief overview of how the above two approaches have been incorporated in landscape quality evaluation in policy and practice.

4.1 History

Swanwick et al. (2007: 13-17) describe in detail the history of how landscape evaluation debates from the 1970s evolved over the intervening decades into the landscape character approaches that currently prevail. In a nutshell, on one side of the argument, the (mainly) quantifying, 'objective' or expert approaches favoured some of the fragmented and static techniques featured in Section 3.1 above. Such approaches supposed the value of the landscape to lie in its component parts, and thus a tallying up of these parts could be used to determine its worth, and generalised across time and space – a fundamentally

positivist notion of landscape value. However, a development of this approach, which allowed for more cultural and historical variation, was to check which features were aligned with public landscape preferences. Such studies sought to combine 'objective' and 'subjective' measures, and a typical way of doing this was to deploy the statistical method of multiple regression analysis to link the scenic preferences of observers with particular features or qualities of the landscape. Many such combined studies have also informed the findings reported in section 3.1 including, for example, the funding of a high incidence of water features in landscapes preferred by the public.

On the other side, a more 'holistic' and 'subjective' style of evaluation proposed either the 'holistic' visual judgements of aesthetic evaluation, or a more 'embodied' multi-sensory and cognitive holism. This approach tended to favour qualitative methodology, drawing on public views and preferences. It allowed exploration of the many elements discussed in section 3.2, and their various combinations in different places, so highlighting place specificity. Implicit in the wider notion of 'holism', going beyond the aesthetic, is the idea that 'in landscape the whole is greater than the sum of the component parts and also that experiential value is significant' (Swanwick et al., 2007: 15).

Studies attempting to combine the two kinds of approaches have helpfully highlighted that 'positive responses to a landscape can often arise from responses to the whole scene, whereas negative responses often stem from a dislike of individual components' (ibid.: 15). However, many methodological tensions have been noted in such combined approaches, and as the review of academic studies in Sections 3.1 and 3.2 has shown, there has been no abatement in the quest among scholars to bring a quantitative framework to bear on questions of landscape value.

4.2 Fragmented and holistic approaches to evaluation

In the world of policy and professional practice, a somewhat different version of the fragmented, holistic and combined approaches has developed. Something of the fragmented approach is evident in the ecosystem services method, a widely-adopted way of communicating the value of nature to the public, which divides the environment into four kinds of functions of use to humanity: supporting (or habitat), provisioning, regulating and cultural services. These are then subdivided into various subsidiary functions and the framework that results is used as the basis for auditing the natural environment - and in some versions, undertaking detailed economic valuation. According to Natural England (NE):

> *Without a landscape dimension, a focus on ecosystem services can result in fragmented, 'set piece', projects which do not result in coherent and valued future places. Recent research has proposed 'landscape services' as an alternative to ecosystem services (Termorshuizen and Opdam, 2009; de Groot et al, 2009), and, whilst this may not supplant the well-established policy use of ecosystem services, it emphasises the importance of recognising the particularities of how such services*

become manifest in spatial patterns and processes. (NE, 2015: 15 – footnote of references transferred into text for this excerpt).

This quote is taken from one of several Natural England studies, described in more detail below, that adopt combined analytical and holistic landscape approaches. In spite of its relatively analytical bias, the ecosystem services approach allows – at least in its cultural services component – space for people's feelings about landscape, the so-called subjective side of evaluation. However, some long term, partly quantitative monitoring that lacks this dimension has featured in England's landscape oversight. Perhaps the longest-running survey is the New Agricultural Landscapes survey, which began in 1972 and has investigated seven different farmland case study areas across England every 11 years, over the intervening decades (The Countryside Agency, 2006). The survey was established by the Countryside Commission in response to growing concerns about the impacts of intensive farming on the environment and includes a comprehensive photographic record whereby the same viewpoints are revisited at each cycle to document changes over time.

Detailed 'objective' monitoring has also been undertaken for the Environmental Stewardship Objective (ESO), after this was introduced in 2005. The monitoring survey became closely tied to the purpose of assessing the impact of ESO on landscape quality at the National Character Area (NCA) scale (see below for an explanation of NCAs). As such, a physical features approach was adopted, covering over 17 subcategories of natural and built landscape features under six headings. The current ESO monitoring approach is primarily a desk exercise, collating data from diverse official secondary data sources (LUC and Julie Martin Associates, 2013). There is no input from the public, and no monitoring of sensory or dynamic elements of landscape. Quality is simply a question of 'the condition of landscape in relation to perceptions or expectations of what the typical or ideal characteristics of a given area should be'. These are to be evaluated 'good, fair or poor' (LUC and Rural Focus Limited, 2016:4).

Counterbalancing the ESO, the Monitor of Engagement with the Natural Environment (MENE) survey[14], which has been running since 2009 (NE, 2017; 2018), is one of the main quantitative ways of gauging public perceptions and preferences regarding their local greenspaces and countryside. The entire data set from nine years of monitoring is now available online and a technical report on the series includes the methodology and questions from the current survey (NE, 2018: Appendix 1: 37-53). The survey has many dimensions, foremost among which may be its capacity to assess the use made by the public of their natural environments (both local and distant) and to understand changing attitudes towards the environment and environmentally-conscious lifestyles over time. While it does include some questions on landscape as experience, even including in one instance, aesthetic experience, it is mainly focused on landscape as amenity. Therefore, in a sense it underwrites the approach towards the natural environment as primarily an

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[14] The MENE survey was jointly commissioned in 2009 from consultants TNS by Defra, Natural England and the Forestry Commission.

ecosystem service, rather than something whose value may be more intrinsic or multi-faceted.

The developing practice of economic valuation of landscape, whose foundations are mapped out in Swanwick et al. (2007), has also continued the so-called 'objective' tradition of quantitative landscape valuation. A significant off-shoot of this is the 'natural capital' approach adopted by Defra (ONS, 2017) and embraced in the 25YEP (HMG, 2018: 16; 19-20).

By contrast with the fragmented and analytical approaches described above, a policy version of a holistic approach to landscape can be seen in the general shift from landscape evaluation to Landscape Character Assessment (LCA) over the course of the last three decades. The Landscape Character approach was introduced, at first informally, in the UK in 1985 and has gradually won wider uptake so it is now recommended by government as part of a formal approach to decision-making around landscape in all the constituent countries of the UK, and is also used in the Republic of Ireland. The essence of the approach is that landscapes are distinctive and so appraisal of them should be place-based and specific, rather than based upon shared features or attributes of value applied to all landscapes across the board. It is not expert views of distinctiveness that count so much as the public's response in identifying the key characteristics and valued landscape features of the landscape concerned. Furthermore, the question of the landscape's value is interwoven with other vital questions in relation to its distinctive character, such as how it should be managed and what kinds of changes would be acceptable or unacceptable.

Part of the process of recognising and understanding landscape distinctiveness lies in recording individual landscape components or elements, but the focus of the Landscape Character approach is more on how such elements are combined to create the landscape character, including its historic character, and its overall aesthetic and visual appeal. Furthermore, given that in the wider definition, preferred in LCA guidance, landscape is an integrative concept, a variety of views and approaches must be taken into account, so the approach emphasises stakeholder involvement, which generally implies broadly qualitative methods and a holistic perspective.

Although it has been alluded to in the discussion of some of the academic and policy work reviewed, it has been outside the scope of this paper to consider whether landscape evaluation is generally shared across cultures, which would be an argument for a psycho-biological basis, or whether it differs between cultures, or between people with different kinds of knowledge, skillsets and experience. This is because research finds both commonalities and variation (e.g. Howley, 2011; Adevi and Grahn, 2012), with a suggestion of some broad systematic differences between expert and lay views, and between the views of visitors and those who dwell in and/or work the land. There are also likely to be differences based on cultural and religious background and on whether the person resides in a rural, urban or edgeland location (see the summary of significant personal factors in Swanwick et al., 2007: 20, and a different breakdown is presented in research on the experience of landscape by Natural England in 2009: 27-30).

This approach has the virtue of being able to cater for the wide range in attitudes towards landscape found among the public, as identified by Natural England:

> *The research also suggested that there was a range of different attitude types amongst those people who participated, showing differing levels of integration or engagement with the landscape. At one end of the spectrum are those who are more transactional with the landscape (they see it as something they use to obtain exercise or entertainment). At the other are people who thought the landscape was part of the fabric of their lives, whether they worked with it or attitudinally felt very in tune with it.* (NE, 2009: 26).

Local authorities and other bodies managing designated land, including national parks, consultants, developers, landowners and community groups, use LCA locally which include local engagement and are frequently used to support local planning policies or management plans. The government web page on LCA recommends the following four stage process for an LCA: defining the area and resources for the work; a desk study of the area including soliciting stakeholder opinion; a field survey of the study area, capturing aesthetic, perceptual and experiential qualities of the landscape; and finally, mapping, classifying and recording the features and characteristics of the landscape, including social and cultural influences (Gov.uk, 2014). Advice in this guidance on 'what to include' suggests the following: 'topographic features, flora and fauna, land use, sights, sounds, touch and smells, cultural associations, history and memories' (ibid.). The guidance also notes that LCAs are useful for documenting change.

LCAs are mainly used at a local, district or county scale. At the top of the scale are larger areas originally known as Joint Character Areas (now National Character Areas or NCAs), of which 159 have been identified for England in work begun by the Countryside Agency then continued by Natural England; although unfortunately, even in England, there is no guarantee of fit between LCAs and NCAs, nor of consistency of approach between the different LCAs (Swanwick and Fairclough, 2018). Different approaches towards NCA are used in Scotland, Wales and Northern Ireland.

In 2000 the Rural White Paper: 'Our Countryside: the Future' (DETR, 2000) introduced the Countryside Quality Counts Project (CQC); a multi-agency, cross-disciplinary project commissioned by the government. A survey arising from the project, the Countryside Quality Counts Survey (CQCS), developed by the Countryside Agency in 2004, monitored change in England's NCAs in a multi-dimensional way (TCA, 2004). First, the characteristic landscape features; second, the state of other elements including verges, banksides and field margins but also historic buildings and uptake of environmental grants; third, the extent of new development and infrastructure (including farm buildings); and fourth, and importantly, a range of experiential aspects such as 'tranquillity/noise', 'levels of traffic', 'remoteness/rurality/wilderness', 'disturbed ground' and 'access/welcoming feel'. It can be seen that this approach combines the fragmented and holistic approaches, the latter exhibited particularly through the fourth set of dimensions. However, although these

appear to relate to experiential aspects of landscape, in fact there was no public engagement or social science aspect to the CQC work.[15]

Another combined approach to landscape was the successor to CQC, namely the Character and Quality of England's Landscapes (CQuEL) project, piloted by Natural England in 2010. This linked the Landscape Character approach, including the top tier of NCAs, with an evaluation of selected ecosystem services, assessed against objectives in the NCA profiles; the idea was to carry out side by side assessments of landscape function and landscape quality, including landscape change, in the light of NCAs, but also at lower levels like major catchments, administrative regions, uplands and coastal areas (NE, 2010: 5). The CQuEL pilot established an appropriate method for the work although it was not continued due to lack of resources[16].

Furthermore, intensive qualitative work, exploring public opinion about various aspects of landscapes, was undertaken by Natural England in 2009 and 2011 under the banner of 'Experiencing Landscapes'. The first of these reports focused upon 8 NCAs, across a range of landscape typologies, with the broad aim of updating these. It included a literature review and extensive qualitative research with the public with the aim of developing baseline evidence of the cultural services and experiential qualities that landscapes provide to society. The qualitative research used eight types of cultural service adapted from the Millennium Ecosystem Assessment as a structure through which to capture people's responses. In line with the ecosystem services approach which is primarily about 'what can landscape do for us', these categories include: a sense of history; a sense of place; inspiration; relaxation; recreation; spiritual; learning and escapism (NE, 2009: 4). The project explored a much wider range of dynamic physical experiences in landscape which went beyond the walking and cycling dynamic experience studied by Pierskalla et al. (2016) and mentioned in section 3.2.2 above. The Natural England project included drivers, country sportsmen, rock-climbers, off-roaders, those working the land, families (who want their children to be 'outdoorsy'), naturalists and refreshment hunters (NE, 2009: 26-27). The account also notes that people can use more than one of these modes of engagement at different times, or shift from one form to the next as they grow older. The project also explored public views of many of the landscape elements discussed in Section 3.1, throwing up fresh public perspectives on areas such as woodlands, water and coast, but also variety and simplicity; openness and enclosure; natural versus man-made.

The second report (NE, 2011) expanded the research to a further six types of national landscape, and integrated its findings with that of the first one, (NE, 2009), with the intention of providing general findings that would help to update the set of England NCAs and develop understanding of cultural services and experiential qualities across a range of

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[15] Although there was an intention to follow up the survey with some public participation work on the topic 'does change matter', in the event there was no funding available to do so (Personal Communication to lead author, 23 January, 2019).

[16] Based on Personal Communication to lead author, 23 January, 2019.

landscape types. This second report identified a hierarchy within the cultural services offered by landscape according to the ecosystem services approach. At the bottom of this were the more structured and organised landscapes, easy to find and use, that are more appealing for families and young people. In the middle of the scale were escape and self-generated experiences in landscape, found to be extremely important for people's calm and wellbeing. At the top of the scale were the rarer moments of inspiration and spiritual experience in landscape (NE, 2011: 8). This research was also significant in discovering that some landscapes offer significantly fewer cultural services than others, and that 'there are various forces of change that concern people – urban sprawl, infrastructure development and intensive agriculture being the most important' (ibid.: 9).

The impact of landscape change had also been a topic of earlier participatory work with the public, including the New Map of England Project in the 1990s, by the New Map Consortium, and some research carried out for Scottish National Heritage by Land Use Consultants in 2006 (both are described in Swanwick et al. 2007: 19). Some useful conclusions drawn by the authors from these studies were that people are generally for the conservation and preservation of existing landscapes as against new landscapes created by change and/or development.[17] Another conclusion is that people find it difficult to separate landscape change issues from other social, economic and environmental matters, so 'it is therefore important not to read too much into responses if very complex issues of landscape change are oversimplified in designing surveys' (Swanwick et al., 2007: 19).

In 2012, Natural England commissioned the EcoLAP study (Econets, Landscape and People) in order to 'help understand how to capture the public's perceptions of landscape change, aesthetic and cultural value' (NE, 2015:1). The project also aimed to demonstrate practical ways and benefits of using this information on public perceptions 'to complement natural science data and mapping information when planning and designing ecological networks' (ibid.:1). The fundamental idea was to use the cultural services component from the ecosystems services approach as a framework for investigating how human aspects of landscape, including cultural values, could be integrated into the design and implementation of ecological networks (econets): connected landscapes, providing continuous habitats and wildlife stepping stones and corridors across England.

5. Conclusion and recommendations

The starting point of this Review was the weight given to beauty and aesthetic quality as one of the ten goals in the government's 25YEP and the need to incorporate the progress made toward this goal in Defra's monitoring programme. The scope of the Review was determined by two of Defra's 40 monitoring indicators (H11 and H14). These highlight the significance of how change in landscape quality is perceived by people and affects their

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[17] This might be seen as a corrective to a cruder interpretation of the Natural Capital approach, which goes beyond attributing economic value to natural assets, to promoting the idea of their substitutability.

engagement in landscape and, hence, their wellbeing. The purpose of this Review has, therefore, been to inform Defra's monitoring and evaluation of landscape quality with a particular focus on the notion of 'natural beauty' and related aesthetic qualities.

Our review of a large body of academic and policy literature has shown the diversity of approaches to landscape evaluation. Despite this, we have been able to identify two distinct sets of approaches to appreciation and judgment of landscape quality which we have called: the 'fragmented, static' approach and the 'holistic, engaged' approach, while acknowledging that in the actual practice of landscape quality evaluation, these may sometimes be combined. The distinction has been helpful to draw out the differences so that it becomes clearer what is contributed, and what is omitted by each approach.

While we acknowledge the importance of the more static approaches as an integral part of understanding change in landscape, such as for the changes in its biodiversity and cultural and historical features, we have demonstrated why these should be complemented by the more holistic, engaged approach to landscape evaluation, in order to fulfil a key goal of the 25YEP and incorporate people's holistic judgement of landscape quality and value in future monitoring of the Plan.

The story of landscape evaluation and assessment in policy outlined in Section 4 indicates a recent history of increasingly sophisticated mixed methods that contribute a rich and deep understanding of how to bring together scientific, experiential and amenity values in monitoring of landscape. It also shows that either such monitoring continues in a place-sensitive, engaged, yet disparate and uncoordinated manner through Landscape Character Assessment; or conversely tends towards the more use-value focused, quantitative approaches in a range of specialist areas from the economic evaluation of Agricultural Landscapes, meeting the Environmental Stewardship Objective, or public use of and engagement with landscapes through the MENE survey.

The 25YEP monitoring programme is based around a number of indicators that can be collated from existing specialist and sectoral monitoring programmes. Our review shows that to be effective, monitoring must attend to both the findings of place-sensitive, engaged and holistic approaches, as in the Landscape Character Assessment, and the more detached, fragmented and analytical approaches of the quantitative surveys. Furthermore, we find in aspects of the aesthetic appreciation of landscape, as foregrounded in the 25YEP, a model for a more holistic and engaged approach to landscape, and to natural environments generally, which is to be welcomed as a counterbalance to the more instrumental and transactional approaches that have necessarily emerged to embrace the diverse nature of the roles landscape fulfils for land managers, public institutions and the general public.

The Review has also led us to make the following more specific recommendations:

•   Landscape Character Assessments need to be made more consistent and comparable among themselves, and to correspond with National Character Areas, if the rich information that they produce is to be useful for landscape quality monitoring at a national level.

•	Given the number of initiatives that have been undertaken, but then discontinued or suspended, there is need to collate, compare and critique the various national-level surveys that have taken place regarding landscape features, landscape quality, landscape change and experiential measures, and identify the best ways in which to take these forward, while drawing maximum benefit from the existing time-series.

•	The landscape research can also usefully turn its focus on the areas which this Review have found to be new or under-researched, for example:

o	the way different groups of people in different places engage with and experience landscape

o	the link between cognitive dimensions of landscape appreciation and different value systems

o	the way landscape is used by people for restoring calm and well-being

o	the importance of congruity between multi-sensory dimensions in landscape (e.g. smell, sight, sounds and touch)

o	the contribution of insect life to landscape experience.

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