Natural capital indicators and metrics evidence review: cultural ecosystem services, health and wellbeing

Caroline Ward[1], Jenny Craven[2], Martin Dallimer[3] and Piran C. L. White[4]

[1] Department of Health Sciences & Leverhulme Centre for Anthropocene Biodiversity, University of York, York YO10 5DD, UK

[2] Natural England, Foss House, Kings Pool, 1-2 Peasholme Green, York, YO1 7PX, UK

[3] Sustainability Research Institute, School of Earth and Environment, University of Leeds, Leeds LS2 9JT, UK

[4] Department of Environment and Geography & York Environmental Sustainability Institute, University of York, York YO10 5DD, UK

Report details

Acknowledgements

Contents

Summary

The aim of this project was to carry out two reviews of the peer-reviewed scientific literature demonstrating the links between natural capital assets (their quantity, quality and location) and (1) cultural ecosystem services and (2) health and wellbeing benefits. This was based on the findings of Natural England's Natural Capital Indicators project (Lusardi et al, 2018), which developed a logic chain framework to illustrate the links between assets (quantity, quality and location), ecosystem services and benefits. The cultural services logic chain is shown in Figure 1. There are logic chains for each of the eight broad habitat types (coastal margins; farmland; freshwater; marine; mountain, moorland and heath; semi-natural grasslands; urban; and woodlands) and these can be found in Annex 3 of Natural Capital Indicators: for defining and measuring change in natural capital report (NERR076) (Lusardi et al 2018). This project builds upon the review that had already been conducted on provisioning and regulating ecosystem services (Cruz et al 2019).
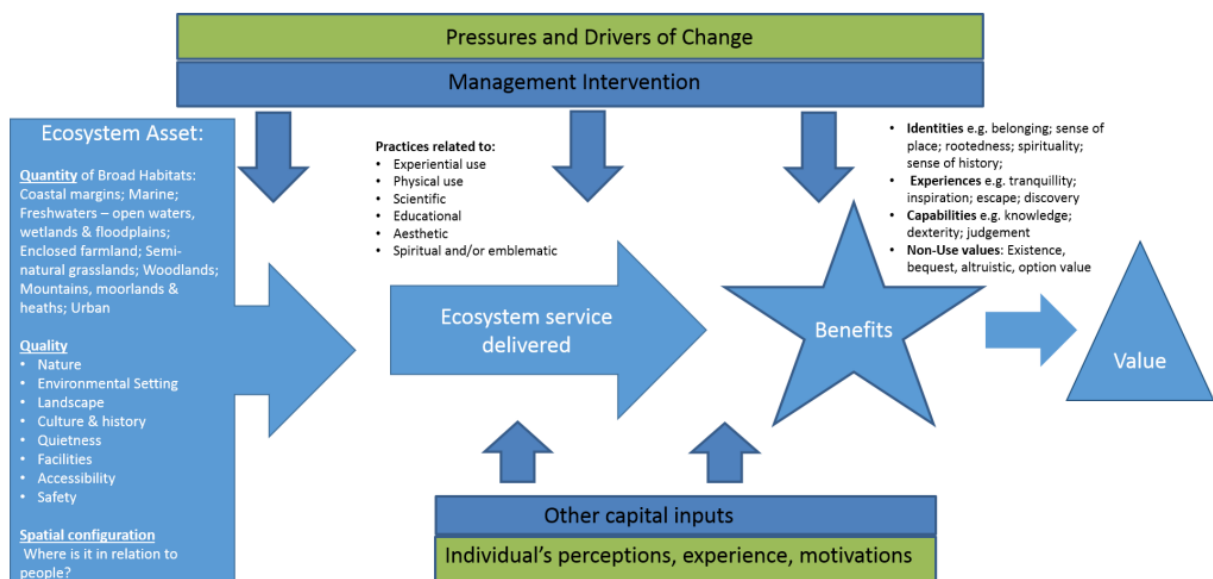
Figure 1: Natural England's natural capital logic chain for cultural ecosystem services (Lusardi et al 2018)

This report follows the definitions outlined in the Natural Capital Indicators report and shown in Table 1.

Table 1: Definitions of key terms used in this report, adapted from Lusardi et al 2018

Terms	Definition
Indicator	A property of the environment, practice or benefit, not defined by specific measurable units
Metric	Quantitative measure of a specific indicator, with defined measurable units
Ecosystem asset	A description of the properties of the asset, based on three characteristics – quantity, quality and spatial configuration
Ecosystem service flow	The rate of delivery of ecosystem services from an ecosystem asset
Benefit	The benefits to people that are obtained from ecosystem services
Logic chain	Also known as a causal model, demonstrating the links in a process to deliver a particular outcome. In this report, the logic chains depict the links between ecosystem assets, services, benefits and values and the factors affecting them

The following report is divided into two sections: the first outlining the methods and results for the cultural ecosystem services review; and the second outlining the methods and results for the health and wellbeing benefits review.

For both sections, we report the numbers of studies using different indicators and metrics, however this does not mean we advocate using these numbers to justify which indicators users of the tool should choose. The numbers of studies for each indicator do not necessarily reflect that these are the best approaches, but instead reflect the prevalence within the literature.

The project outputs are:

- A dataset in Excel spreadsheet format, with the following data fields: broad habitat, logic chain step, aspect, indicator category, indicator, ecosystem service or benefit, metric, metric unit, biological group/species, country, site, type of article, article abstract and article reference;
- An extension to the web-based Natural Capital Indicators and Metrics Evidence Review tool providing all the evidence in the Excel spreadsheet in an easily searchable and accessible form, including links to evidence sources.

Cultural ecosystem services

Methodology

This report follows the same methodological approach as Cruz et al (2019). The Natural Capital Indicators report (Lusardi et al 2018) groups indicators for cultural ecosystem services together into a single logic chain for each broad habitat, with the ecosystem services reflected as practices that people do in a place (aligned with the CICES framework). For this review we separated the searches into the categories of cultural ecosystem services following the CICES (V5.1) groupings and scientific literature (Table 2). These search groupings were agreed between the key team (CW, PW, JC & MD) and also in collaboration with other Natural England experts.

Table 2: Cultural ecosystem service categories for literature search strings

Search grouping	Relevance to CICES (V5.1)	Relevance to Natural England logic chain
Experiential & physical use	Physical and experiential interactions with natural environment	Ecosystem Service Flow Practices related to: Experiential & physical use
Scientific and educational	Intellectual and representative interactions with natural environment	Ecosystem Service Flow Practices related to: Scientific/educational
Aesthetic	Other biotic characteristics that have a non-use value	Ecosystem Service Flow Practices related to: Aesthetic
Spiritual/emblematic	Spiritual, symbolic and other interactions with natural environment	Ecosystem Service Flow Practices related to: Spiritual and/or symbolic
Identity	Other biotic characteristics that have a non-use value	Benefits: identities
Calm/restoration	Other biotic characteristics that have a non-use value	Benefits: experiences

A review of the peer-reviewed scientific literature was undertaken in Web of Science using a search string comprising [(broad habitat)] AND [(keywords related with the ecosystem service group provided by the habitat identified in the logic chains)] AND [(UK countries)]. For example, for the 'experiential and physical' grouping of cultural ecosystem services provided by habitat 'woodlands' the following search string was used: [(woodland OR conifer* OR broadleaved OR yew OR deciduous OR beech OR ash OR oak OR birch OR pine) AND (experien* OR "physical use" OR visit OR volunteer* OR tourism OR ecotourism OR recreation OR sport OR activit* OR participat* OR access*) AND ("cultural ecosystem service*" OR "cultural service*" OR cultur*) AND (Britain OR England OR Wales OR Scotland OR "UK" OR "United Kingdom" OR "Northern Ireland")) NOT (Australia OR "New England" OR Maine OR "USA" OR India OR Brazil OR "New South Wales" OR China OR Thailand OR America OR Philippines OR Nigeria OR Africa OR Holocene OR "New Caledonia" OR Greece OR Egypt OR Poland OR Cyprus OR Canada OR Ethiopia OR Amazonia OR Japan OR Italy OR Tunisia OR Spain OR "South Korea" OR Nepal OR Mozambique) NOT (laboratory)]. For a full list of all the search strings used see Annex 1. Keywords were chosen from the existing logic chains, and in consultation with Natural England experts. In addition, for each habitat type, an extra search was undertaken comprising general cultural ecosystem service key words. For example, for 'woodlands' the general search string was used: [(woodland OR conifer* OR broadleaved OR yew OR deciduous OR beech OR ash OR oak OR birch OR pine) AND ("cultural ecosystem service*" OR "cultural service*" OR cultur*)

AND (Britain OR England OR Wales OR Scotland OR "UK" OR "United Kingdom" OR "Northern Ireland") NOT(Australia OR "New England" OR Maine OR "USA" OR India OR Brazil OR "New South Wales" OR China OR Thailand OR America OR Philippines OR Nigeria OR Africa OR Holocene OR "New Caledonia" OR Greece OR Egypt OR Poland OR Cyprus OR Canada OR Ethiopia OR Amazonia OR Japan OR Italy) NOT (laboratory OR "in vitro")].

The searches were restricted to studies published in English, between the period of January 2010 and September 2021 and searches focused on Title, Keywords and Abstracts of articles. The results from each search were imported to the respective Mendeley library, one for each ecosystem service in each habitat.

The articles were evaluated for inclusion in the review according to a hierarchical assessment of their relevance by: (i) initially screening the article titles and abstracts; (ii) excluding articles that were out of scope based on title and abstract; and (iii) reading the full text of the remaining potentially relevant articles (Figure 2). This selection was carried out by one member of the review team (CW) in consultation with three other members (JC, PW and MD).
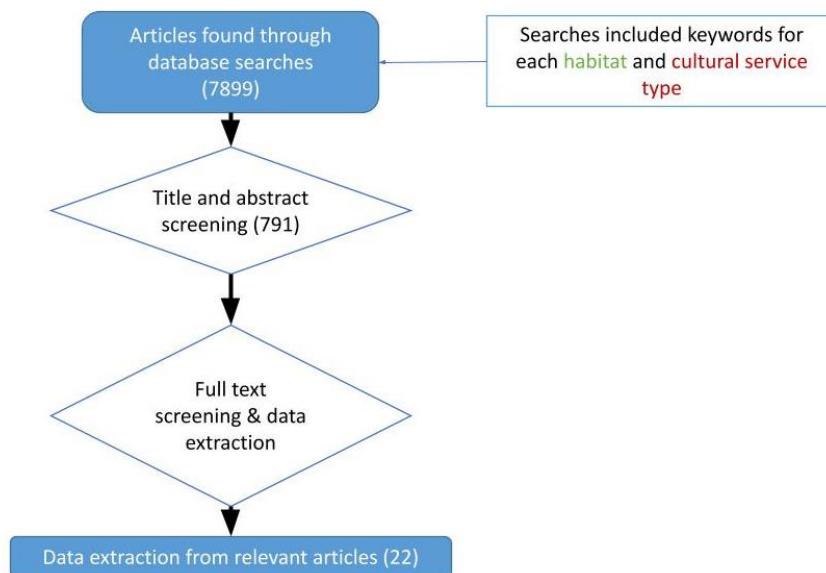
Figure 2: Review stages diagram – cultural services

Data from each relevant article were extracted into a Microsoft Excel spreadsheet and assigned to the following columns: broad habitat, logic chain step, aspect, indicator category, indicator, ecosystem service, metric, metric unit, biological group/species, country, site, type of article, article abstract and article reference. For quality assurance, two members (JC and PW) reviewed the data extracted by CW to make sure that the selected metrics measured ecosystem service flow and/or indicators and followed the rules of inclusion/exclusion. Articles were considered if they provided metrics that measured a change of the ecosystem asset and/or the ecosystem flow that was clearly linked to one of the eight broad habitats (Figure 3). The rules for inclusion/exclusion are illustrated in Table 3.

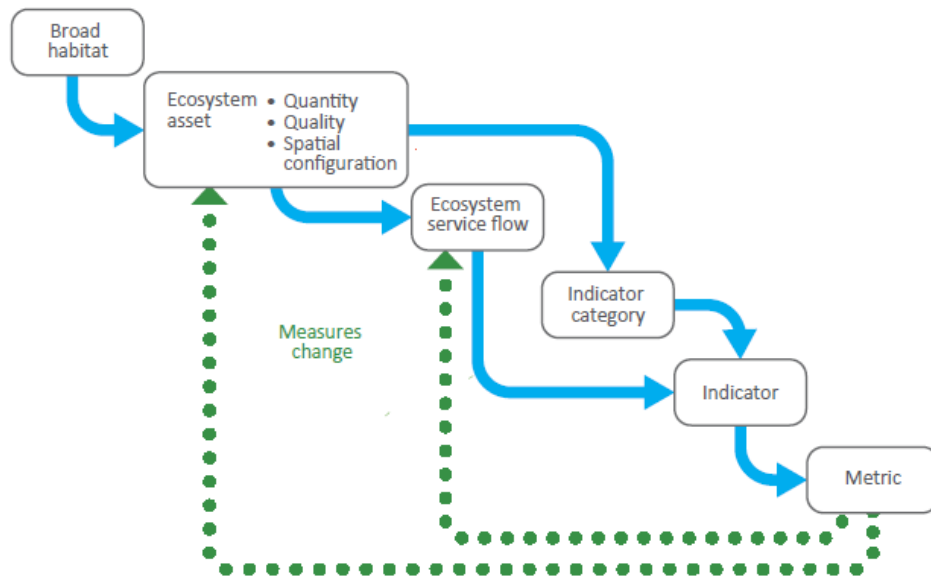*Figure 3: Framework for metric selection to measure ecosystem assets and/or ecosystem service flow change, based on Natural England's Natural Capital Indicators project (originally from Cruz et al 2019).*

Table 3: Inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria
● Metric measures ecosystem service flow OR ecosystem assets *linked* to ecosystem service flow	● Experimental design is set in environmental conditions e.g. laboratory or mesocosm conditions
● Provides primary data	● The metrics are a result of modelled conditions
● Includes information on habitat types	● Metrics are statistically transformed into 'artificial' metrics by PCA, CCA, factorial analysis etc.
	● Metric is an economic measure
	● Study focusses on political boundaries without specifying habitat types
	● Chosen metrics are not supported by primary data

Results

We identified 23 relevant studies, many of which included more than one indicator and habitat, leading to a total of 116 references. The majority of references (n=76; 66%) focused on the 'ecosystem service flow' part of the logic chain (Figure 4). The exceptions to this were for the habitat type 'mountain, moorland and heath', which had a greater number of references for 'ecosystem asset' than 'ecosystem service flow', and 'farmland' which had equal numbers.
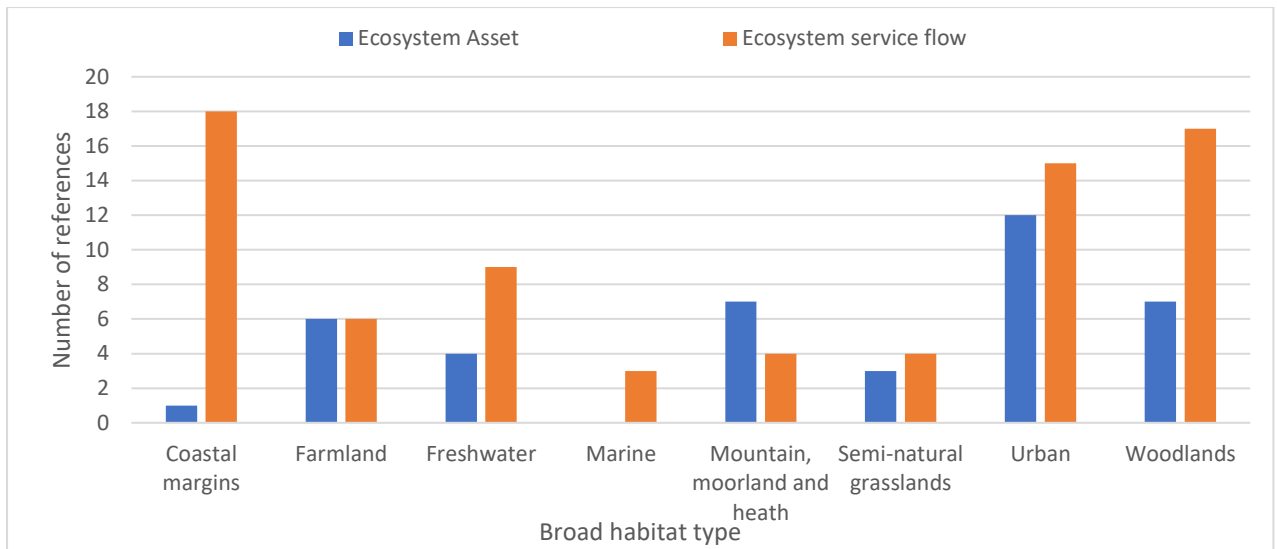
Figure 4: Number of references per logic chain step, by habitat type

The broad habitat with the largest number of references was urban (27 references; 23%), followed by woodlands (24 references; 21%), whilst marine had the smallest number of references (3; 2%) (Figure 5). The same pattern was found for numbers of indicators and metrics, with urban having the highest number of both, and marine the lowest (Figure 5).
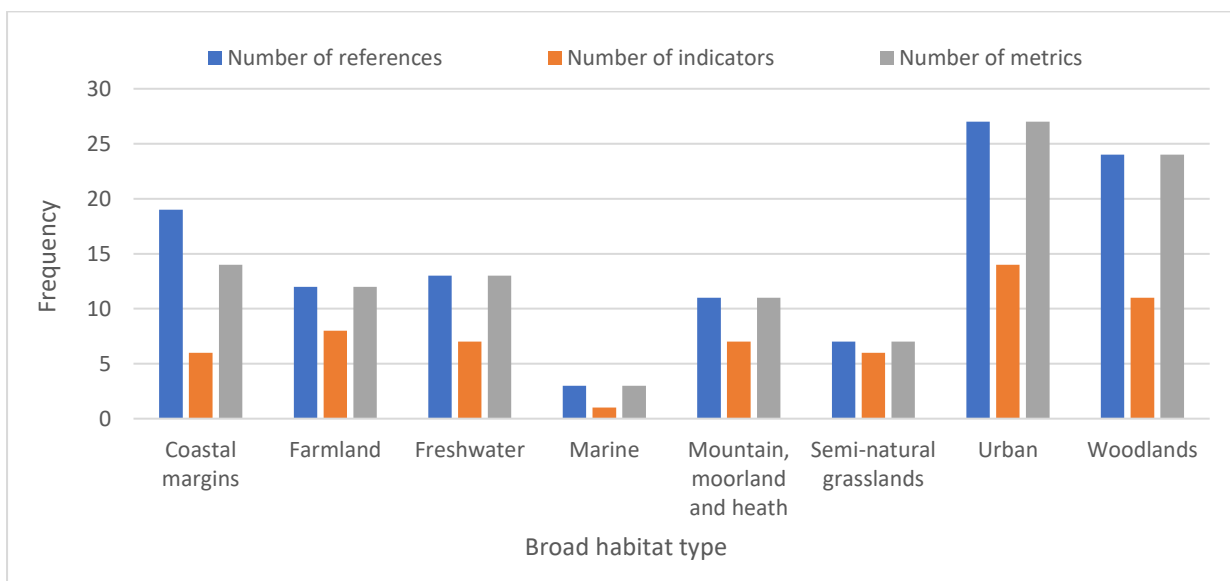
Figure 5: Number of references, indicators and metrics per habitat

The indicator category with the highest number of references was 'Experiential and physical use' (58 references; 50%) (Figure 6), whilst 'Facilities' and 'Safety' had the joint lowest number of references (2 references each; 2%). The indicator category of 'Experiential & physical use' also had the highest number of references for all habitat types, with the exception of mountain, moorland and heath – for which 'landscape' was the most frequent indicator category (Table 4).
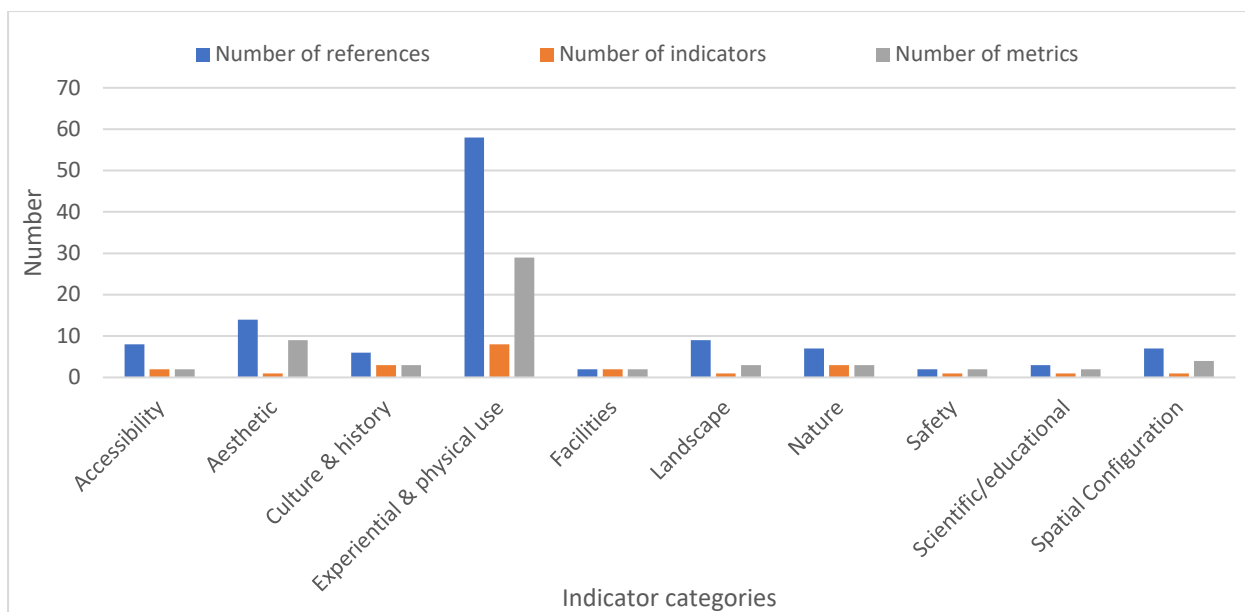
Figure 6: Number of references, indicators and metrics per indicator category

Table 4: Number of references per indicator category, per broad habitat type – shading indicates frequency

		Broad habitat types							
		Coastal margins	Farmland	Freshwater	Marine	Mountain, moorland and heath	Semi-natural grasslands	Urban	Woodlands
Indicator categories	Accessibility	1	1	1		1	1	2	1
	Aesthetic	5	1	3		2	1	1	1
	Culture & history		1	1		2		1	1
	Experiential & physical use	13	4	6	3	1	3	13	15
	Facilities							2	
	Landscape		3			3			3
	Nature		1	1		1	1	2	1
	Safety							2	
	Scientific/ educational		1			1			1
	Spatial Configuration			1			1	4	1

There was a total of 21 indicators across the 116 references. Overall, the indicators with the highest number of references were 'recreational activities' (27), 'Visitor numbers' (22) and 'social media posts' (16). Figure 7 shows the distribution of the most frequent indicators across habitat types.
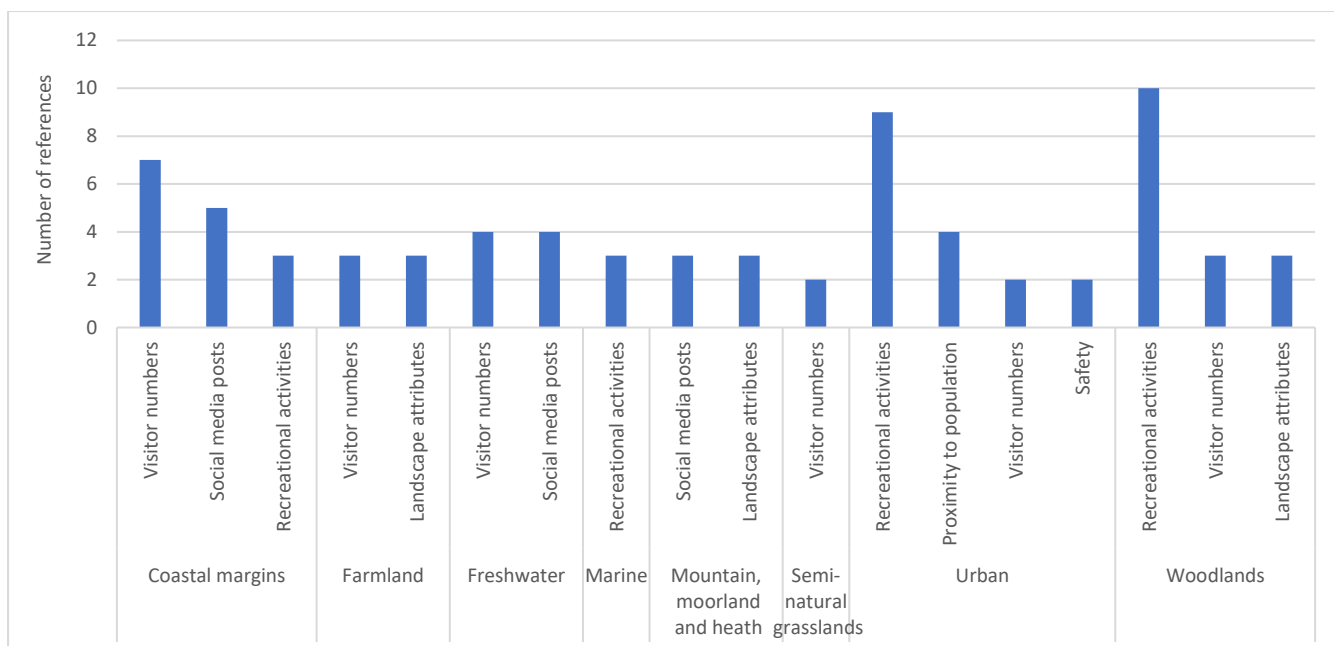
Figure 7: Most frequent indicators (>1) per broad habitat type

There was a total of 59 metrics recorded across the 116 references. The metrics used in the highest number of references were 'mean path length' (7) and 'number of survey respondents who had visited location for recreation in past week' (7), followed by 'number of visitors per year', 'number of recreational activities listed by survey participants per location' and 'number of Flickr visitor days per month' (all with 4 references each).

There was a large range in the number of metrics per indicator, with 'recreational activities' having 15 associated metrics. Thirteen of the 21 indicators had a single metric associated with them. Table 5 shows the metrics associated with each indicator.

Table 5: Metrics associated with each indicator for cultural ecosystem services

Indicator	Metric	Number of references
Culture & history	Number of text labels on Ordnance Survey maps referencing heritage features per site	1
Educational & community events	Number of educational and community events taking place per year	1
Educational & research visitors	Number of educational/research visitors per year	1
	Number of educational/research visitors per year.	2
	Total number of school visits per year	1
Energy expenditure	Accumulated calorific expenditure per year	1
Facilities	Number of text labels on Ordnance Survey maps referencing facilities per site	1
Habitat mosaics	Numbers of aggregate or individual CVS (Countryside Vegetation System) types within site	3
Landscape attributes	Number of distinct Ordnance Survey symbols on site map (1:25k)	3
	Number of natural features (e.g. significant mountain summits, fairly pools etc.) per site	3
	Number of special features present per site	3
Mature trees	Tree preservation orders per km2	1

Paths & tracks	Mean path length	7
Proximity to population	Distance from site to nearest urban centre	3
	Mean distance per resident to patches of >100ha of ancient woodland	2
	Number of dwellings within Local Authority District (LAD) closer to space of interest than any other spaces	1
	Number of residential addresses within 300m buffer	1
Public Rights of Way	Mean total length of definitive Public Rights of Way	1
Recreational activities	Number of children observed climbing trees, making dens in shrubs and running about in green spaces per sampling route per day	2
	Number of people observed collecting flowers, berries or sticks per sampling route per day	2
	Number of people observed sitting on park benches or lying on the grass reading or sunbathing per sampling route per day	1
	Number of people observed sitting on park benches or lying or the grass reading or sunbathing per sampling route per day	1
	Number of people observed walking/cycling and having one or more dogs with them per sampling route per day	2
	Number of people observed walking/cycling at a strolling pace, carrying rucksacks or walking sticks and watching people and surroundings; also cycling at relative speed and being dressed with cycling gear per sampling route per day	2
	Number of people observed with bird watching equipment who are using bird watching facilities per sampling route per day	2
	Number of recreational activities (outdoor swimming, horse riding, running, cycling, walking, playing, hunting, fishing) listed by survey participants per location	4
	Number of scuba diving activity days per year	2
	Number of sea kayaker activity days per year	2
	Number of two or more people observed chatting to each other while standing in the paths, or in parks per sampling route per day	2
	Number of young man and woman with at least one child having a picnic or sitting and playing in the park (sometimes with grandparents) observed per sampling route per day	1
	Number of young men and women with at least one child having a picnic or sitting and playing in the park (sometimes with grandparents) observed per sampling route per day	1
	Response to question asking what activities visitors have done while visiting	1
	Total number of passengers undertaking wildlife viewing trips per year	2
Safety	The number of crimes (excluding burglary & fraud) per km2 within a 0.5km radius of the space	1
	The number of crimes (excluding burglary & fraud) within a space per 4 months	1
Social media posts	Average photo user days per 1-ha grid cell per year	1
	Monthly number of Flickr visitor days (a person taking at least one photograph a day in the relevant location)	4
	Monthly number of Flickr visitor days (a person taking at least one photograph a day in the relevant location) with keywords bird, seal, dolphin and whale	1
	Number of georeferenced photos uploaded to Flickr per year	1
	Number of geotagged photos uploaded to Flickr (from Flickr launch to 2018) with tranquillity-associated keywords (atmosphere, calm- ness,	2

	peace, peaceful, pleasant, serene, tranquillity, tranquil, silence, silent, quiet) per 75x75m	
	Number of geotagged photos uploaded to Flickr with tranquillity-associated keywords (atmosphere, calm- ness, peace, peaceful, pleasant, serene, tranquillity, tranquil, silence, silent, quiet) per 75x75m	1
	Number of Instagram posts with relevant hashtags	1
	Percentage of Tripadvisor reviews mentioning aesthetic-related keywords per 8 years	2
	Percentage of Tripadvisor reviews mentioning cultural heritage-related keywords per 8 years	2
	The number of individuals per unit area (1 km2) uploading photographs to Google Earth via the Panoramio web platform	1
Spiritual and religious features	Total number of spiritual and religious elements per site	3
SSSIs and Priority habitat	Proportion of site in SSSI or Priority Habitats inventory	3
Travel distance	Mean distance travelled to reach location per visitor	2
	Mean visitor travel distance by postcode (return journey)	2
Visit duration	Response to question asking how long visitors stayed	1
Visit frequency	Questionnaire categorical response visit frequency (every day, 2 or 3 times a week, once per week, 2 or 3 times a month, once a month, 2 or 3 times a year, less than once per year, never)	1
Visitor numbers	Annual number of person-visits from gate entry data combined with a field survey carried out at the main access points	2
	Daily car park counts over 3-month period	2
	Number of day leisure visits per 10x10km square	1
	Number of survey respondents who had visited location for recreation in past week	7
	Number of visitors per year	3
	Number of visitors recorded on camera traps	3
	Total visitor numbers per year	4
Volunteer hours	Volunteer hours per month during the growing season (March to October)	1

Health & wellbeing

Methodology

Due to the large number of studies in this area and limits on project time and resources, the literature searches for health and wellbeing focused on identifying existing reviews. Firstly, a review of the peer-reviewed scientific literature was undertaken in Web of Science using a search string comprising [(broad habitat)] AND [(keywords related with health and wellbeing benefits)] AND [systematic review]. For example, for the 'health and wellbeing' benefits provided by habitat 'woodlands' the following search string was used: [(woodland OR conifer* OR broadleaved OR yew OR deciduous OR beech OR ash OR oak OR birch OR pine OR forest) AND (health OR wellbeing OR well-being OR "well being") AND ("systematic review"). The searches were restricted to studies published in English, between the period of January 2019 and September 2021 and searches focused on Title, Keywords and Abstracts of articles. These results were screened and the reviews with the highest citation rate for each habitat were added to the Mendeley library, in order to maximise the number of primary studies included within each habitat.

Secondly, a more general literature review was undertaken in Web of Science using the following search string: [(biodiversity OR "natural environment") AND (health OR wellbeing OR well-being OR "well being") AND "systematic review". These results were screened and the 4 reviews with the highest citation rate that included at least one study conducted in the UK were added to the Mendeley library. For a full list of all searches, see Annex 2.

Thirdly, a wider group of the project team (consisting of experts in physical and mental health, and the relationships between nature and health and wellbeing) were asked to identify reviews linking nature to health and wellbeing. This identified a number of reports which did not have citation data, therefore the project team chose which of these to include through consideration of the authorship of each report, to ensure a wide representation across different research groups active in this area. These three processes (Figure 8) resulted in 8 review papers and 3 major reports being selected (Table 6). The limited timeframe for the literature searches meant that we were able to identify the most recent reviews with up to date papers. The limitation of comparing citation rates meant that reviews published most recently were at a disadvantage. However, this was the best approach possible and the project team, including experts in health and wellbeing agreed that the final selection of review papers was a fair representation of the literature. For each review, CW read the papers included, extracting the papers which focused on the UK and following the criteria outlined in Table 3.
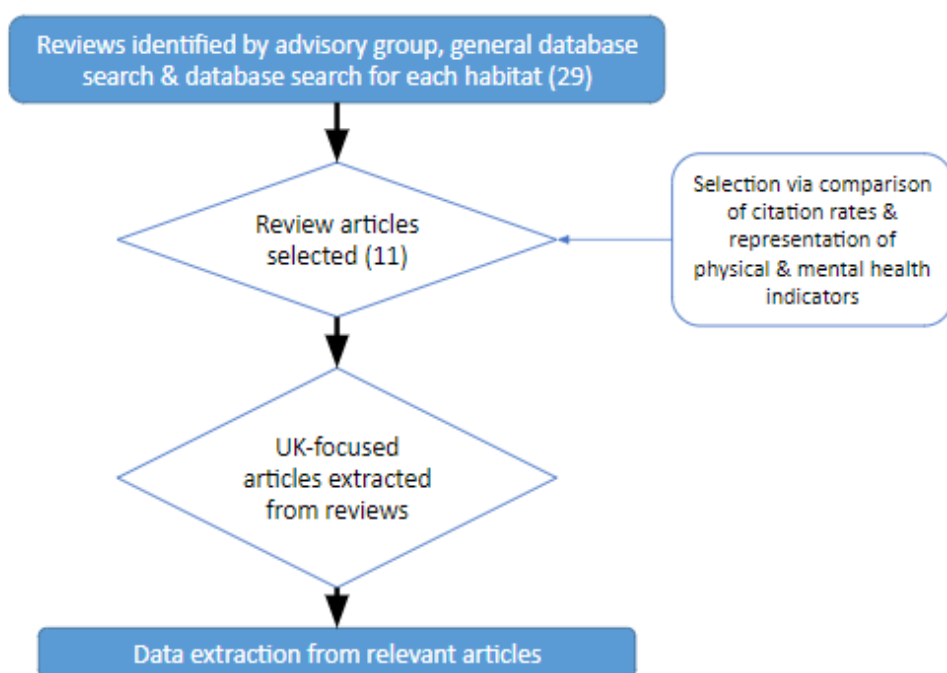
Figure 8: Review stages for health and wellbeing benefit searches

Table 6: Finalised list of review papers included for health and wellbeing

Paper title	Reason for inclusion	Reference
Environmental, health, wellbeing, social and equity effects of urban green space interventions: A meta-narrative evidence synthesis	Top cited relevant paper in urban habitat searches	Hunter, R.F., Cleland, C., Cleary, A., Droomers, M., Wheeler, B.W., Sinnett, D., Nieuwenhuijsen, M.J. and Braubach, M., 2019. Environmental, health, wellbeing, social and equity effects of urban green space interventions: A meta-narrative evidence synthesis. *Environment international, 130*, p.104923.
Marine protected areas and human well-being – A systematic review and recommendations	Top cited paper in marine habitat searches	Rasheed, A.R., 2020. Marine protected areas and human well-being–A systematic review and recommendations. *Ecosystem Services, 41*, p.101048.
Psycho-Physiological Stress Recovery in Outdoor Nature-Based Interventions: A Systematic Review of the Past Eight Years of Research	Top cited paper in woodland habitat searches	Corazon, S.S., Sidenius, U., Poulsen, D.V., Gramkow, M.C. and Stigsdotter, U.K., 2019. Psycho-physiological stress recovery in outdoor nature-based interventions: A systematic review of the past eight years of research. *International journal of environmental research and public health, 16*(10), p.1711.
Frontiers in coastal well-being and ecosystem services research: A systematic review	Top cited paper in coastal margins habitat searches	Blythe, J., Armitage, D., Alonso, G., Campbell, D., Dias, A.C.E., Epstein, G., Marschke, M. and Nayak, P., 2020. Frontiers in coastal well-being and ecosystem services research: A systematic review. *Ocean & Coastal Management, 185*, p.105028.
Public Health England: Improving access to greenspace A new review for 2020	Report suggested by project team	Public Health England, 2020. Improving Access to Greenspace: A New Review for 2020.

EKLIPSE: Types and characteristics of urban and peri-urban blue spaces having an impact on human mental health and wellbeing: a systematic review	Major EU project; Report suggested by project team	Beute, F., Andreucci, M.B., Lammel, A., Davies, Z.G., Glanville, J., Keune, H., Marselle, M., O'Brien, L.A., Olszewska-Guizzo, A., Remmen, R. and Russo, A., 2020. Types and characteristics of urban and peri-urban green spaces having an impact on human mental health and wellbeing: a systematic review.
Therapeutic Nature: Nature-based social prescribing for diagnosed mental health conditions in the UK.	Report suggested by project team	Garside, R., Orr, N., Short, R., Lovell, R., Husk, K., McEachan, R., Rashid, R. and Dickie, I., 2020. Therapeutic Nature: nature-based social prescribing for diagnosed mental health conditions in the UK. *Final Report for DEFRA*.
Blue care: a systematic review of blue space interventions for health and wellbeing	Top 4 papers by citation rate from general 'nature, biodiversity, natural environments' search	Britton, E., Kindermann, G., Domegan, C. and Carlin, C., 2020. Blue care: a systematic review of blue space interventions for health and wellbeing. *Health Promotion International*, *35*(1), pp.50-69.
The Effects of Green Exercise on Physical and Mental Wellbeing: A Systematic Review	Top 4 papers by citation rate from general 'nature, biodiversity, natural environments' search	Lahart, I., Darcy, P., Gidlow, C. and Calogiuri, G., 2019. The effects of green exercise on physical and mental wellbeing: A systematic review. *International journal of environmental research and public health*, *16*(8), p.1352.
Linking public urban green spaces and human well-being: A systematic review	Top 4 papers by citation rate from general 'nature, biodiversity, natural environments' search	Reyes-Riveros, R., Altamirano, A., De La Barrera, F., Rozas, D., Vieli, L. and Meli, P., 2021. Linking public urban green spaces and human well-being: A systematic review. *Urban Forestry & Urban Greening*, p.127105.
Mental, physical and social health benefits of immersive nature-experience for children and adolescents: A systematic review and quality assessment of the evidence	Top 4 papers by citation rate from general 'nature, biodiversity, natural environments' search	Mygind, L., Kjeldsted, E., Hartmeyer, R., Mygind, E., Bølling, M. and Bentsen, P., 2019. Mental, physical and social health benefits of immersive nature-experience for children and adolescents: A systematic review and quality assessment of the evidence. *Health & Place*, *58*, p.102136.

The Excel database for indicators and metrics of health and wellbeing was established using the same process as for the database for cultural ecosystem services. Data from each relevant article were extracted into a Microsoft Excel spreadsheet and assigned to the following columns: broad habitat, logic chain step, aspect, indicator category, indicator, ecosystem service, metric, metric unit, biological group/species, country, site, type of article, article abstract and article reference Figure 8. For quality assurance, PW, JC and MD checked the database and selected articles.

Results

We identified 48 relevant studies from the primary scientific literature in the 11 selected reviews, many of which included more than one indicator and habitat, leading to a total of 183 individual references in the database.

The broad habitat supported by the largest number of individual references included across the 11 reviews was urban (70 references; 38%), followed by coastal margins (32 references; 17%) and freshwater (28 references; 15%). The habitat types with the fewest references were marine (2 references; 1%) and mountain, moorland and heath (6 references; 3%). The same pattern is evident for numbers of indicators and metrics per habitat type (Figure 9).

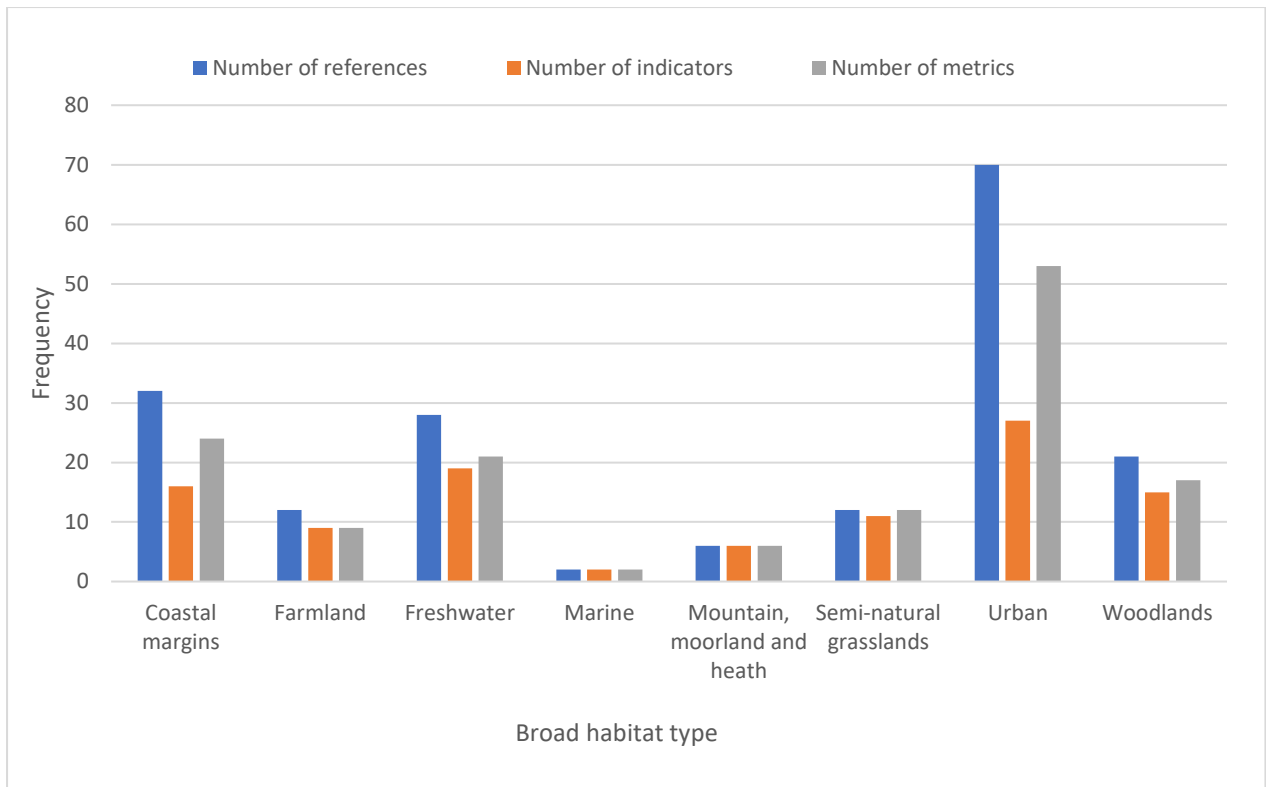*Figure 9: Number of references, indicators and metrics per habitat type*

The benefit type with the highest number of references was 'mental health' (88 references; 48%), with 'physical health' having the fewest (33 references; 18%) (Figure 10). The same pattern was found for number of indicators and metrics (Figure 10).
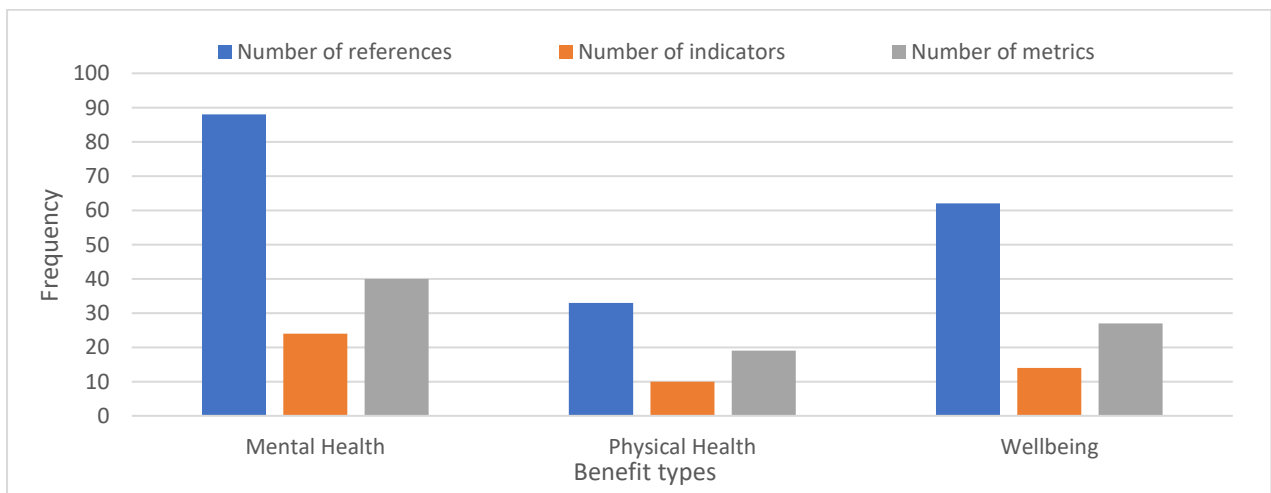
Figure 10: Number of references, indicators and metrics per benefit type

The 'urban' habitat type had the highest numbers of references for all three benefit types ('mental health' – 38; 'physical health – 12; 'wellbeing' – 20; Figure 11). 'Farmland' and 'Mountain, moorland and heath' had no references relating to 'physical health' and 'Marine' had no references relating to either mental or physical health.
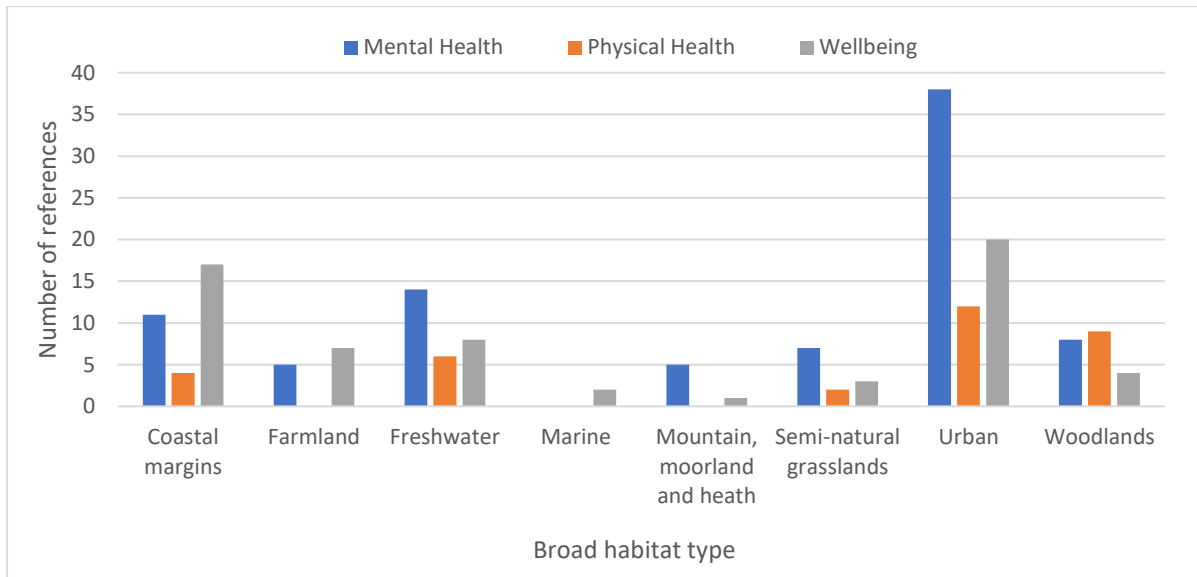
Figure 11: Number of references per benefit type per habitat type

There was a total of 33 indicators across the references. The most frequent indicators were 'restoration' (18 references), 'mental wellbeing' (14 references), 'perceived stress' (13 references), and 'general health' (13 references). The indicators were relatively evenly split across the habitat types (Table 7).

Table 7: Frequency of indicators per broad habitat – shading indicates frequency

		Broad habitat type							
		Coastal margins	Farmland	Freshwater	Marine	Mountain, moorland and heath	Semi-natural grasslands	Urban	Woodlands
Indicators	Restoration	2	1	2		1	1	8	3
	Mental Wellbeing	2	2	2			1	6	1
	Perceived stress	3	2	3			1	4	
	General Health	2	1	1		1	1	4	3
	Wellbeing	6			1			4	1
	Mental health	3	1	1		1	1	3	2
	Mood	1		2			2	4	1
	Affect	3	1	2				3	1
	Exercise intensity			3				2	2

	1	2	3	4	5	6	7	8
Happiness	1	1	1		1	1	1	1
Social Wellbeing	2	1	1				2	
Sleep quality			1			1	2	1
Psychological Wellbeing	1		1			1	2	
Physiological stress			2				5	
Physical activity							4	1
Depression	1	2	1				1	
Physical health	1					1	1	1
Emotion							4	
Resilience	1		1		1			
Quality of life							3	
Fitness	3							
Self-efficacy			1		1			
Self esteem			1					1
Directed attention						1	1	
Cognitive function			1				1	
Aerobic fitness			1					1
Vitality							1	
Social, emotional & behavioural difficulties							1	
Psychological distress							1	
Obesity							1	
No somatisation							1	
Identity				1				

	Energy expenditure									1

 'Restoration' was the most frequent indicator for 'mental health' benefits (14 references), 'exercise intensity' the most frequent indicator for 'physical health' (9 references), and 'wellbeing' the most frequent indicator for 'wellbeing' (Figure 12).
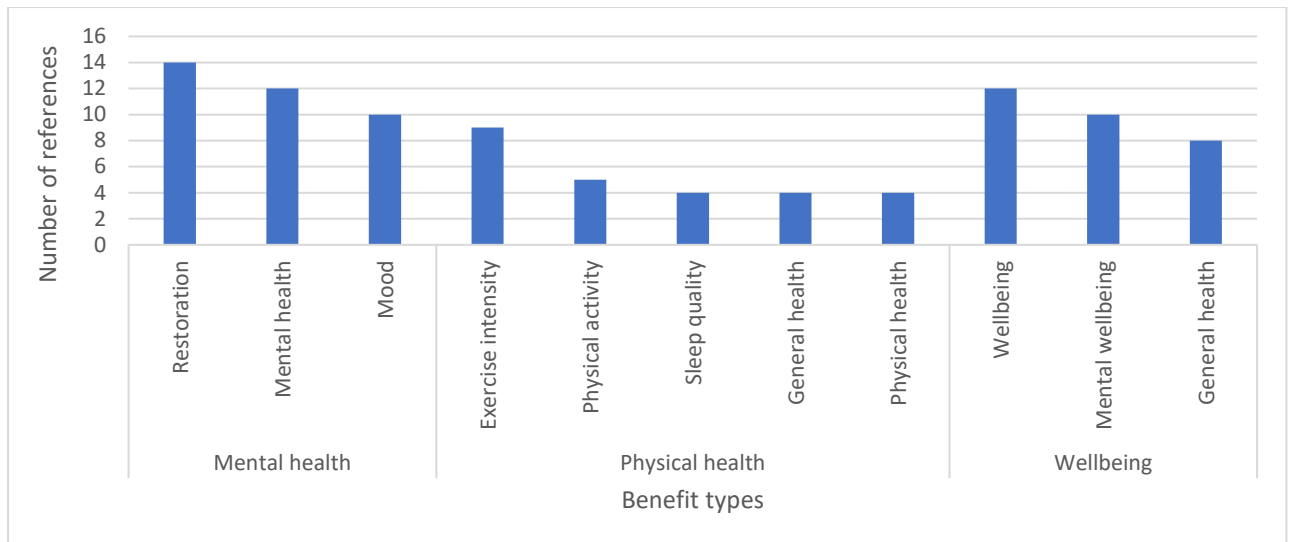

Figure 12: Most frequent indicators per benefit type

There was a total of 75 metrics across the indicators recorded. The most frequent metrics were 'Warwick-Edinburgh Mental Wellbeing Scale (WEMWBS)' and 'Perceived Stress Scale (PSS)', both with 13 references. There were a moderate range of metrics per indicator, with the indicator 'wellbeing' having 9 associated metrics. 14 of the indicators only had one metric associated with them. Table 8 shows a full list of indicators and associated metrics.

Table 8: Health and wellbeing indicators and associated metrics

Indicator	Metric	Number of references
Aerobic fitness	The FITNESSGRAM PACER test	2
Affect	Adapted version of the Parent-Child Interaction System (PARCHISY)	1
	Positive and Negative Affect Schedule (PANAS)	7
	The Feeling Scale, an 11-point bipolar scale ranging from –5 (very bad) to +5 (very good)	1
	Types of Positive Affect Scale (TPAS)	1
Cognitive function	Backward Digit Span (BDS) score	2
Depression	Major Depressive Inventory	5
Directed attention	Backward Digit Span (BDS) score	2
Emotional Response	Responses to 'How did you feel about this place?' expressed as happy to sad emoji faces with responses converted to a 5 point Likert scale	1
Emotional State	Mean brain electrical activity	2

Emotional Wellbeing	The Stirling Childrens Wellbeing Scale (SCWBS) validated as a single item on the scale's Positive Affect component	1
Emotions	Positivity/negativity of tweets	1
Energy expenditure	Quality Adjusted Life Years (QALYs)	1
Exercise intensity	Ambulatory heart rate	2
	Rate of perceived exertion	2
Fitness	Diastolic blood pressure	1
	Resting heart rate	1
	Systolic blood pressure	1
General Health	European Quality of Life 5 Dimensions (EQ-5D)	2
	Responses to "How is your health in general?" with 5 possible answers: Very good; Good; Fair; Bad; Very bad	7
	Responses to single-item self-report measure: "Please think back over the last 12 months about how your health has on the whole been", "very poor (1) to "excellent" (5)	1
	Short form Health Survey (SF-12) Version 2	2
Happiness	Response to "do you feel happy" on a 10 point Likert scale	6
	Short depression and happiness scale	1
Identity	Mean Likert scale response to statement: 'At these sites I feel part of something that is greater than myself'	1
Mental health	Antidepressant prescription rate	1
	Recovering Quality of Life scale (ReQoL)	1
	Short form General Health Questionnaire	10
Mental Wellbeing	Short Warwick-Edinburgh Mental Wellbeing Scale (WEMWBS)	4
	Warwick-Edinburgh Mental Wellbeing Scale (WEMWBS)	9
Mood	Profile of Mood States (POMS)	4
	Shortened 14-item version of the University of Wales Institute of Science and Technology Mood Adjective Checklist (UWIST)	1
	Shortened, 30-item version of the Profile Of Mood States (POMS)	2
No somatisation	Seven questions from an adaptation of the four-dimensional symptom questionnaire (4DSQ)	1
Obesity	Body Mass Index (BMI)	1
Overall health	Responses to a single item asking participants to rate their general health, ranked on a 5-category Likert scale from 1 (very poor health) to 5 (very good health)	1
Parent-reported mental Wellbeing	Strengths and Difficulties questionnaire	1
Perceived exertion	Rate of perceived exertion	3
Perceived stress	Perceived Stress Scale (PSS)	13
Physical activity	Number of days on which physical activity (of sufficient exertion to raise breathing rate) reached or exceeded 30 min, recalled over the preceding 4 weeks	1
	Responses to "How often do you take part in active sport for 30 min or more?", with response categories ranging from "5 times a week or more" to "never"	1

	Responses to "How often do you take part in moderate exercise where you are active for 30 min or more, or in two 15 min sessions?" with response categories ranging from "5 times a week or more" to "never"	1
	Responses to a single item, asking how much time per week, on average, respondents spent taking physical exercise outdoors, including walking	2
Physical health	National Obesity Observatory Standard Evaluation Framework	1
	Rating of physical health compared to other people of same age on a 5-point Likert scale	2
	Scottish Physical Activity Questionnaire (SPAQ)	1
Physiological stress	Diastolic blood pressure	1
	Heart rate	1
	Heart rate variability (HRV)	2
	Salivary cortisol	2
	Systolic blood pressure	1
Psychological distress	General Health Questionnaire (GHQ)	1
Psychological restoration	Reduced form of the Attention Restoration Theory (ART) survey	1
Psychological Wellbeing	Rosenberg Self-esteem Scale (RSE)	4
	Subscale of The Medical Outcome Study Short Form (SF-36) general health survey	1
Quality of life	ONS self-reported independent aspects of respondents' quality of life	1
	Quality of life scale (CASP-19)	1
	Recovering Quality of Life scale (ReQoL)	1
Resilience	The Resilience Scale	2
Resilience/self-esteem	Responses to Validated item for 13-16 year olds on Warwick-Edinburgh Mental Wellbeing Scale (WEMWBS) Validated item on Rosenberg Self Esteem Scale (RSE)	1
Restoration	Level of agreement with 24 attitudinal statements related to restorative and affective aspects of site	2
	Mean of survey responses on a Likert scale to "it made me feel calm and relaxed" and "it made me feel refreshed and revitalised"	8
	Response to attitudinal statements "I feel comfortable on this walk", "This walk allows me to escape more mundane routines and work", "I feel relaxed on this walk", "This walk reveals a special unique place"	2
	Restoration Outcomes Scale (ROS)	2
Restorative effect	Restoration Outcome Scale (ROS)	2
	Zuckerman's Inventory of Personal Reactions	1
Self esteem	Rosenberg Self-esteem Scale (RSE)	2
Self-efficacy	The General Self Efficacy scale	2
Self-reported Wellbeing	The relevant section of the Youth version of the British Panel Household Survey (BPHS-Y)	1
Sleep quality	Heart rate variability (HRV)	4
	Proportion of nights per week participants responded to the statement "I did sleep well" with yes	1

Social Wellbeing	10-item Appraisal subscale of the Interpersonal Support Evaluation List (ISEL)	4
	Children's Society validated item in draft Children's Wellbeing Scale	1
	Responses to three aspects: place belonging, ("how strongly do you feel you belong to your neighbourhood or local area?") ranked on a 5-item scale from "strongly disagree" to "strongly agree"; social isolation ("how often do you feel that you lack companionship?"), ranked on a 3-item scale of "often", "some of the time" or "hardly ever"; and neighbourhood trust (how comfortable giving your home key to a neighbour to keep an eye on while you are on holiday), ranked on a 4-item scale from "very uncomfortable" to "very comfortable"	1
Social, emotional & behavioural difficulties	Strengths and Difficulties questionnaire	1
Subjective mood	Mean 'University of Wales Institute of Science and Technology Mood Adjective Checklist' score	1
Subjective Wellbeing	Mean 'Short Warwick-Edinburgh Mental Wellbeing Scale' score	1
	Responses to UK's Office of National Statistics four subjective Wellbeing questions	1
	Warwick Edinburgh Mental Wellbeing Scale (WEMWBS)	4
Total Mood Disturbance	Brunel Mood Scale (BRUMS)	2
Vitality	Adapted SF-36 general health survey vitality dimension	1
Wellbeing	Responses to a set of 15 indicator statements	1
	Responses to Global Life Satisfaction question	1
	The 'positive outlook' subscale of the Stirling Children's Wellbeing Scale (SCWBS)	1
	The Stirling Children's Wellbeing Scale (SCWBS)	1

References

Cruz, J., Cowie, C., Harrison, L., Kyte, A., Waters, D., Lusardi, J., White, P.C.L. (2019). Natural Capital Indicators and Metrics Evidence Review. University of York.

Lusardi, J., P. Rice, R. D. Waters, and J. Craven. 2018. Natural Capital Indicators: for defining and measuring change in natural capital, Natural England.

Annex 1 – Search string: cultural ecosystem services

Broad Habitat Type	Cultural Ecosystem Service group	Search string
Woodland	General	(((((ALL=(woodland OR conifer* OR broadleaved OR yew OR deciduous OR beech OR ash OR oak OR birch OR pine)) AND ALL=("cultural ecosystem service*" OR "cultural service*" OR cultur*)) AND ALL=(Britain OR England OR Wales OR Scotland OR "UK" OR "United Kingdom" OR "Northern Ireland")) NOT ALL=(Australia OR "New England" OR Maine OR "USA" OR India OR Brazil OR "New South Wales" OR China OR Thailand OR America OR Philippines OR Nigeria OR Africa OR Holocene OR "New Caledonia" OR Greece OR Egypt OR Poland OR Cyprus OR Canada OR Ethiopia OR Amazonia OR Japan OR Italy)) NOT ALL=(laboratory OR "in vitro"))
	Experiential & physical use	(((ALL=(woodland OR conifer* OR broadleaved OR yew OR deciduous OR beech OR ash OR oak OR birch OR pine)) AND ALL=(experien* OR "physical use" OR visit OR volunteer* OR tourism OR ecotourism OR recreation OR sport OR activit* OR participat* OR access*)) AND ALL=("cultural ecosystem service*" OR "cultural service*" OR cultur*) AND ALL=(Britain OR England OR Wales OR Scotland OR "UK" OR "United Kingdom" OR "Northern Ireland")) NOT ALL=(Australia OR "New England" OR Maine OR "USA" OR India OR Brazil OR "New South Wales" OR China OR Thailand OR America OR Philippines OR Nigeria OR Africa OR Holocene OR "New Caledonia" OR Greece OR Egypt OR Poland OR Cyprus OR Canada OR Ethiopia OR Amazonia OR Japan OR Italy OR Tunisia OR Spain OR "South Korea" OR Nepal OR Mozambique) NOT ALL=(laboratory)
	Scientific and educational	((((((ALL=(woodland OR conifer* OR broadleaved OR yew OR deciduous OR beech OR ash OR oak OR birch OR pine)) AND ALL=(education* OR scien* OR "research project" OR "school visit" OR "citizen science" OR "skill development")) AND ALL=("cultural ecosystem service*" OR "cultural service*" OR cultur*)) AND ALL=(Britain OR England OR Wales OR Scotland OR "UK" OR "United Kingdom" OR "Northern Ireland")) NOT ALL=(Australia OR "New England" OR Maine OR "USA" OR India OR Brazil OR "New South Wales" OR China OR Thailand OR America OR Philippines OR Nigeria OR Africa OR Holocene OR "New Caledonia" OR Greece OR Egypt OR Poland OR Cyprus OR Canada OR Ethiopia OR Amazonia OR Japan)) NOT ALL=(laboratory))
	Aesthetic	((((((ALL=(woodland OR conifer* OR broadleaved OR yew OR deciduous OR beech OR ash OR oak OR birch OR pine)) AND ALL=(aesthetic* OR beaut* OR photo* OR "social media" OR appreciation OR "artistic representation")) AND ALL=("cultural ecosystem service*" OR "cultural service*" OR cultur*)) AND ALL=(Britain OR England OR Wales OR Scotland OR "UK" OR "United Kingdom" OR "Northern Ireland")) NOT ALL=(Australia OR "New England" OR Maine OR "USA" OR India OR Brazil OR "New South Wales" OR China OR Thailand OR America OR Philippines OR Nigeria OR Africa OR Holocene OR "New Caledonia" OR Greece OR Egypt OR Poland OR Cyprus OR Canada OR Ethiopia OR Amazonia OR Japan OR Italy OR Tunisia)) NOT ALL=(photosynthe* OR surgery OR photochemical OR laboratory OR childbirth))

	Spiritual/emblematic	((((((ALL=(woodland OR conifer* OR broadleaved OR yew OR deciduous OR beech OR ash OR oak OR birch OR pine)) AND ALL=(spirit* OR emblem* OR "traditional practice*" OR "traditional festival*" OR symbol* OR sacred)) AND ALL=("ecosystem service*" OR "cultural ecosystem service*" OR "cultural service*" OR cultur*)) AND ALL=(Britain OR England OR Wales OR Scotland OR "UK" OR "United Kingdom" OR "Northern Ireland")) NOT ALL=(Australia OR "New England" OR Maine OR "USA" OR India OR Brazil OR "New South Wales" OR China OR Thailand OR America OR Philippines OR Nigeria OR Africa OR Holocene OR "New Caledonia" OR Greece OR Egypt OR Poland OR Cyprus OR Canada OR Ethiopia OR Amazonia OR Japan OR Italy OR Tunisia)) NOT ALL=("in vitro" OR "post-partum" OR laboratory))	
		((((((ALL=(woodland OR conifer* OR broadleaved OR yew OR deciduous OR beech OR ash OR oak OR birch OR pine)) AND ALL=(mindful* OR calm* OR restorat* OR tranquil* OR connect*)) AND ALL=("ecosystem service*" OR "cultural ecosystem service*" OR "cultural service*" OR cultur*)) AND ALL=(Britain OR England OR Wales OR Scotland OR "UK" OR "United Kingdom" OR "Northern Ireland")) NOT ALL=(Australia OR "New England" OR Maine OR "USA" OR India OR Brazil OR "New South Wales" OR China OR Thailand OR America OR Philippines OR Nigeria OR Africa OR Holocene OR "New Caledonia" OR Greece OR Egypt OR Poland OR Cyprus OR Canada OR Ethiopia OR Amazonia OR Japan OR Italy OR Tunisia)) NOT ALL=("in vitro" OR "post-partum" OR laboratory))	
	Identity	((((((ALL=(woodland OR conifer* OR broadleaved OR yew OR deciduous OR beech OR ash OR oak OR birch OR pine)) AND ALL=(identit* OR belong* OR "sense of place" OR rootedness)) AND ALL=("ecosystem service*" OR "cultural ecosystem service*" OR "cultural service*" OR cultur*)) AND ALL=(Britain OR England OR Wales OR Scotland OR "UK" OR "United Kingdom" OR "Northern Ireland")) NOT ALL=(Australia OR "New England" OR Maine OR "USA" OR India OR Brazil OR "New South Wales" OR China OR Thailand OR America OR Philippines OR Nigeria OR Africa OR Holocene OR "New Caledonia" OR Greece OR Egypt OR Poland OR Cyprus OR Canada OR Ethiopia OR Amazonia OR Japan OR Italy OR Tunisia)) NOT ALL=("in vitro" OR "post-partum" OR laboratory))	
Coastal margins	General	(((((ALL=(coast* OR dune OR "salt marsh" OR saltmarsh OR "mud flat" OR mudflat OR beach OR shingle)) AND ALL=("cultural ecosystem service*" OR "cultural service*" OR cultur*)) AND ALL=(Britain OR England OR Wales OR Scotland OR "UK" OR "United Kingdom" OR "Northern Ireland")) NOT ALL=(Australia OR "New England" OR Maine OR "USA" OR India OR Brazil OR "New South Wales" OR China OR Thailand OR America OR Philippines OR Nigeria OR Africa OR Holocene OR "New Caledonia" OR Greece OR Egypt OR Poland OR Cyprus OR Canada OR Ethiopia OR Amazonia OR Japan OR Italy)) NOT ALL=(laboratory))	
	Experiential & physical use	(((ALL=(coast* OR dune OR "salt marsh" OR saltmarsh OR "mud flat" OR mudflat OR beach OR shingle)) AND ALL=(experien* OR "physical use" OR visit OR volunteer* OR tourism OR ecotourism OR recreation OR sport OR activit* OR particpat* OR access*)) AND ALL=("cultural ecosystem service*" OR "cultural service*" OR cultur*) AND ALL=(Britain OR England OR Wales OR Scotland OR "UK" OR "United Kingdom" OR "Northern Ireland")) NOT ALL=(Australia OR "New England" OR Maine OR "USA" OR India OR Brazil OR "New South Wales" OR China OR	

		Thailand OR America OR Philippines OR Nigeria OR Africa OR Holocene OR "New Caledonia" OR Greece OR Egypt OR Poland OR Cyprus OR Canada OR Ethiopia OR Amazonia OR Japan OR Italy OR Tunisia OR Spain OR "South Korea" OR Nepal OR Mozambique) NOT ALL=(laboratory)
	Scientific and educational	((((((ALL=(coast* OR dune OR "salt marsh" OR saltmarsh OR "mud flat" OR mudflat OR beach OR shingle)) AND ALL=(education* OR scien* OR "research project" OR "school visit" OR "citizen science" OR "skill development")) AND ALL=("cultural ecosystem service*" OR "cultural service*" OR cultur*)) AND ALL=(Britain OR England OR Wales OR Scotland OR "UK" OR "United Kingdom" OR "Northern Ireland")) NOT ALL=(Australia OR "New England" OR Maine OR "USA" OR India OR Brazil OR "New South Wales" OR China OR Thailand OR America OR Philippines OR Nigeria OR Africa OR Holocene OR "New Caledonia" OR Greece OR Egypt OR Poland OR Cyprus OR Canada OR Ethiopia OR Amazonia OR Japan)) NOT ALL=(laboratory))
	Aesthetic	((((((ALL=(coast* OR dune OR "salt marsh" OR saltmarsh OR "mud flat" OR mudflat OR beach OR shingle)) AND ALL=(aesthetic* OR beaut* OR photo* OR "social media" OR appreciation OR "artistic representation")) AND ALL=("cultural ecosystem service*" OR "cultural service*" OR cultur*)) AND ALL=(Britain OR England OR Wales OR Scotland OR "UK" OR "United Kingdom" OR "Northern Ireland")) NOT ALL=(Australia OR "New England" OR Maine OR "USA" OR India OR Brazil OR "New South Wales" OR China OR Thailand OR America OR Philippines OR Nigeria OR Africa OR Holocene OR "New Caledonia" OR Greece OR Egypt OR Poland OR Cyprus OR Canada OR Ethiopia OR Amazonia OR Japan OR Italy OR Tunisia)) NOT ALL=(photosynthe* OR surgery OR photochemical OR laboratory OR childbirth))
	Spiritual/emblematic	((((((ALL=(coast* OR dune OR "salt marsh" OR saltmarsh OR "mud flat" OR mudflat OR beach OR shingle)) AND ALL=(spirit* OR emblem* OR "traditional practice*" OR "traditional festival*" OR symbol* OR sacred)) AND ALL=("ecosystem service*" OR "cultural ecosystem service*" OR "cultural service*" OR cultur*)) AND ALL=(Britain OR England OR Wales OR Scotland OR "UK" OR "United Kingdom" OR "Northern Ireland")) NOT ALL=(Australia OR "New England" OR Maine OR "USA" OR India OR Brazil OR "New South Wales" OR China OR Thailand OR America OR Philippines OR Nigeria OR Africa OR Holocene OR "New Caledonia" OR Greece OR Egypt OR Poland OR Cyprus OR Canada OR Ethiopia OR Amazonia OR Japan OR Italy OR Tunisia)) NOT ALL=("in vitro" OR "post-partum" OR laboratory))
		((((((ALL=(coast* OR dune OR "salt marsh" OR saltmarsh OR "mud flat" OR mudflat OR beach OR shingle)) AND ALL=(mindful* OR calm* OR restorat* OR tranquil* OR connect*)) AND ALL=("ecosystem service*" OR "cultural ecosystem service*" OR "cultural service*" OR cultur*)) AND ALL=(Britain OR England OR Wales OR Scotland OR "UK" OR "United Kingdom" OR "Northern Ireland")) NOT ALL=(Australia OR "New England" OR Maine OR "USA" OR India OR Brazil OR "New South Wales" OR China OR Thailand OR America OR Philippines OR Nigeria OR Africa OR Holocene OR "New Caledonia" OR Greece OR Egypt OR Poland OR Cyprus OR Canada OR Ethiopia OR Amazonia OR Japan OR Italy OR Tunisia)) NOT ALL=("in vitro" OR "post-partum" OR laboratory OR "ecological restoration"))

	Identity	(((((((ALL=(coast* OR dune OR "salt marsh" OR saltmarsh OR "mud flat" OR mudflat OR beach OR shingle)) AND ALL=(identit* OR belong* OR "sense of place" OR rootedness)) AND ALL=("ecosystem service*" OR "cultural ecosystem service*" OR "cultural service*" OR cultur*)) AND ALL=(Britain OR England OR Wales OR Scotland OR "UK" OR "United Kingdom" OR "Northern Ireland")) NOT ALL=(Australia OR "New England" OR Maine OR "USA" OR India OR Brazil OR "New South Wales" OR China OR Thailand OR America OR Philippines OR Nigeria OR Africa OR Holocene OR "New Caledonia" OR Greece OR Egypt OR Poland OR Cyprus OR Canada OR Ethiopia OR Amazonia OR Japan OR Italy OR Tunisia)) NOT ALL=("in vitro" OR "post-partum" OR laboratory))
Freshwater	General	((((((ALL=(("Lowland fens" OR "Lowland raised bogs" OR "Reed beds" OR Reedbeds OR freshwater OR river OR pond OR "grazing marsh" OR peat)) AND ALL=("cultural ecosystem service*" OR "cultural service*" OR cultur*)) AND ALL=(Britain OR England OR Wales OR Scotland OR "UK" OR "United Kingdom" OR "Northern Ireland")) NOT ALL=(Australia OR "New England" OR Maine OR "USA" OR India OR Brazil OR "New South Wales" OR China OR Thailand OR America OR Philippines OR Nigeria OR Africa OR Holocene OR "New Caledonia" OR Greece OR Egypt OR Poland OR Cyprus OR Canada OR Ethiopia OR Amazonia OR Japan OR Italy)) NOT ALL=(laboratory))
	Experiential & physical use	(((ALL=("Lowland fens" OR "Lowland raised bogs" OR "Reed beds" OR Reedbeds OR freshwater OR river OR pond OR "grazing marsh" OR peat)) AND ALL=(experien* OR "physical use" OR visit OR volunteer* OR tourism OR ecotourism OR recreation OR sport OR activit* OR participat* OR access*)) AND ALL=("cultural ecosystem service*" OR "cultural service*" OR cultur*) AND ALL=(Britain OR England OR Wales OR Scotland OR "UK" OR "United Kingdom" OR "Northern Ireland")) NOT ALL=(Australia OR "New England" OR Maine OR "USA" OR India OR Brazil OR "New South Wales" OR China OR Thailand OR America OR Philippines OR Nigeria OR Africa OR Holocene OR "New Caledonia" OR Greece OR Egypt OR Poland OR Cyprus OR Canada OR Ethiopia OR Amazonia OR Japan OR Italy OR Tunisia OR Spain OR "South Korea" OR Nepal OR Mozambique) NOT ALL=(laboratory)
	Scientific and educational	((((((ALL=("Lowland fens" OR "Lowland raised bogs" OR "Reed beds" OR Reedbeds OR freshwater OR river OR pond OR "grazing marsh" OR peat)) AND ALL=(education* OR scien* OR "research project" OR "school visit" OR "citizen science" OR "skill development")) AND ALL=("cultural ecosystem service*" OR "cultural service*" OR cultur*)) AND ALL=(Britain OR England OR Wales OR Scotland OR "UK" OR "United Kingdom" OR "Northern Ireland")) NOT ALL=(Australia OR "New England" OR Maine OR "USA" OR India OR Brazil OR "New South Wales" OR China OR Thailand OR America OR Philippines OR Nigeria OR Africa OR Holocene OR "New Caledonia" OR Greece OR Egypt OR Poland OR Cyprus OR Canada OR Ethiopia OR Amazonia OR Japan)) NOT ALL=(laboratory))
	Aesthetic	((((((ALL=("Lowland fens" OR "Lowland raised bogs" OR "Reed beds" OR Reedbeds OR freshwater OR river OR pond OR "grazing marsh" OR peat)) AND ALL=(aesthetic* OR beaut* OR photo* OR "social media" OR appreciation OR "artistic representation")) AND ALL=("cultural ecosystem service*" OR "cultural service*" OR cultur*)) AND ALL=(Britain OR England OR Wales OR Scotland OR "UK" OR "United Kingdom" OR "Northern Ireland")) NOT ALL=(Australia OR "New England" OR Maine OR "USA" OR India OR Brazil OR "New South Wales" OR China OR

		Thailand OR America OR Philippines OR Nigeria OR Africa OR Holocene OR "New Caledonia" OR Greece OR Egypt OR Poland OR Cyprus OR Canada OR Ethiopia OR Amazonia OR Japan OR Italy OR Tunisia)) NOT ALL=(photosynthe* OR surgery OR photochemical OR laboratory OR childbirth))
	Spiritual/emblematic	((((((ALL=("Lowland fens" OR "Lowland raised bogs" OR "Reed beds" OR Reedbeds OR freshwater OR river OR pond OR "grazing marsh" OR peat)) AND ALL=(spirit* OR emblem* OR "traditional practice*" OR "traditional festival*" OR symbol* OR sacred)) AND ALL=("ecosystem service*" OR "cultural ecosystem service*" OR "cultural service*" OR cultur*)) AND ALL=(Britain OR England OR Wales OR Scotland OR "UK" OR "United Kingdom" OR "Northern Ireland")) NOT ALL=(Australia OR "New England" OR Maine OR "USA" OR India OR Brazil OR "New South Wales" OR China OR Thailand OR America OR Philippines OR Nigeria OR Africa OR Holocene OR "New Caledonia" OR Greece OR Egypt OR Poland OR Cyprus OR Canada OR Ethiopia OR Amazonia OR Japan OR Italy OR Tunisia)) NOT ALL=("in vitro" OR "post-partum" OR laboratory))
		((((((ALL=("Lowland fens" OR "Lowland raised bogs" OR "Reed beds" OR Reedbeds OR freshwater OR river OR pond OR "grazing marsh" OR peat)) AND ALL=(mindful* OR calm* OR restorat* OR tranquil* OR connect*)) AND ALL=("ecosystem service*" OR "cultural ecosystem service*" OR "cultural service*" OR cultur*)) AND ALL=(Britain OR England OR Wales OR Scotland OR "UK" OR "United Kingdom" OR "Northern Ireland")) NOT ALL=(Australia OR "New England" OR Maine OR "USA" OR India OR Brazil OR "New South Wales" OR China OR Thailand OR America OR Philippines OR Nigeria OR Africa OR Holocene OR "New Caledonia" OR Greece OR Egypt OR Poland OR Cyprus OR Canada OR Ethiopia OR Amazonia OR Japan OR Italy OR Tunisia)) NOT ALL=("in vitro" OR "post-partum" OR laboratory OR "ecological restoration"))
	Identity	((((((ALL=("Lowland fens" OR "Lowland raised bogs" OR "Reed beds" OR Reedbeds OR freshwater OR river OR pond OR "grazing marsh" OR peat)) AND ALL=(identit* OR belong* OR "sense of place" OR rootedness)) AND ALL=("ecosystem service*" OR "cultural ecosystem service*" OR "cultural service*" OR cultur*)) AND ALL=(Britain OR England OR Wales OR Scotland OR "UK" OR "United Kingdom" OR "Northern Ireland")) NOT ALL=(Australia OR "New England" OR Maine OR "USA" OR India OR Brazil OR "New South Wales" OR China OR Thailand OR America OR Philippines OR Nigeria OR Africa OR Holocene OR "New Caledonia" OR Greece OR Egypt OR Poland OR Cyprus OR Canada OR Ethiopia OR Amazonia OR Japan OR Italy OR Tunisia)) NOT ALL=("in vitro" OR "post-partum" OR laboratory))
Marine	General	(((((ALL=(intertidal OR Subtidal OR seagrass OR maerl OR reef OR (deep sea habitat) OR marine) AND ALL=("cultural ecosystem service*" OR "cultural service*" OR cultur*)) AND ALL=(Britain OR England OR Wales OR Scotland OR "UK" OR "United Kingdom" OR "Northern Ireland")) NOT ALL=(Australia OR "New England" OR Maine OR "USA" OR India OR Brazil OR "New South Wales" OR China OR Thailand OR America OR Philippines OR Nigeria OR Africa OR Holocene OR "New Caledonia" OR Greece OR Egypt OR Poland OR Cyprus OR Canada OR Ethiopia OR Amazonia OR Japan OR Italy)) NOT ALL=(laboratory))

	Experiential & physical use	(ALL=(intertidal OR Subtidal OR seagrass OR maehl OR reef OR "deep sea habitat" OR marine) AND ALL=(experien* OR "physical use" OR visit OR volunteer* OR tourism OR ecotourism OR recreation OR sport OR activit* OR participat* OR access*) AND ALL=("cultural ecosystem service*" OR "cultural service*" OR cultur*) AND ALL=(Britain OR England OR Wales OR Scotland OR "UK" OR "United Kingdom" OR "Northern Ireland") NOT ALL=(Australia OR "New England" OR Maine OR "USA" OR India OR Brazil OR "New South Wales" OR China OR Thailand OR America OR Philippines OR Nigeria OR Africa OR Holocene OR "New Caledonia" OR Greece OR Egypt OR Poland OR Cyprus OR Canada OR Ethiopia OR Amazonia OR Japan OR Italy OR Tunisia OR Spain OR "South Korea" OR Nepal OR Mozambique) NOT ALL=(laboratory))
	Scientific and educational	((((((ALL=(intertidal OR Subtidal OR seagrass OR maerl OR reef OR (deep sea habitat) OR marine) AND ALL=(education* OR scien* OR "research project" OR "school visit" OR "citizen science" OR "skill development")) AND ALL=("cultural ecosystem service*" OR "cultural service*" OR cultur*)) AND ALL=(Britain OR England OR Wales OR Scotland OR "UK" OR "United Kingdom" OR "Northern Ireland")) NOT ALL=(Australia OR "New England" OR Maine OR "USA" OR India OR Brazil OR "New South Wales" OR China OR Thailand OR America OR Philippines OR Nigeria OR Africa OR Holocene OR "New Caledonia" OR Greece OR Egypt OR Poland OR Cyprus OR Canada OR Ethiopia OR Amazonia OR Japan)) NOT ALL=(laboratory))
	Aesthetic	((((((ALL=(intertidal OR Subtidal OR seagrass OR maerl OR reef OR (deep sea habitat) OR marine)) AND ALL=(aesthetic* OR beaut* OR photo* OR "social media" OR appreciation OR "artistic representation")) AND ALL=("cultural ecosystem service*" OR "cultural service*" OR cultur*)) AND ALL=(Britain OR England OR Wales OR Scotland OR "UK" OR "United Kingdom" OR "Northern Ireland")) NOT ALL=(Australia OR "New England" OR Maine OR "USA" OR India OR Brazil OR "New South Wales" OR China OR Thailand OR America OR Philippines OR Nigeria OR Africa OR Holocene OR "New Caledonia" OR Greece OR Egypt OR Poland OR Cyprus OR Canada OR Ethiopia OR Amazonia OR Japan OR Italy OR Tunisia)) NOT ALL=(photosynthe* OR surgery OR photochemical OR laboratory OR childbirth))
	Spiritual/emblematic	((((((ALL=(intertidal OR Subtidal OR seagrass OR maerl OR reef OR (deep sea habitat) OR marine)) AND ALL=(spirit* OR emblem* OR "traditional practice*" OR "traditional festival*" OR symbol* OR sacred)) AND ALL=("ecosystem service*" OR "cultural ecosystem service*" OR "cultural service*" OR cultur*)) AND ALL=(Britain OR England OR Wales OR Scotland OR "UK" OR "United Kingdom" OR "Northern Ireland")) NOT ALL=(Australia OR "New England" OR Maine OR "USA" OR India OR Brazil OR "New South Wales" OR China OR Thailand OR America OR Philippines OR Nigeria OR Africa OR Holocene OR "New Caledonia" OR Greece OR Egypt OR Poland OR Cyprus OR Canada OR Ethiopia OR Amazonia OR Japan OR Italy OR Tunisia)) NOT ALL=("in vitro" OR "post-partum" OR laboratory))
		((((((ALL=(intertidal OR Subtidal OR seagrass OR maerl OR reef OR (deep sea habitat) OR marine)) AND ALL=(mindful* OR calm* OR restorat* OR tranquil* OR connect*)) AND ALL=("ecosystem service*" OR "cultural ecosystem service*" OR "cultural service*" OR cultur*)) AND ALL=(Britain OR England OR Wales OR Scotland OR "UK" OR "United

		Kingdom" OR "Northern Ireland")) NOT ALL=(Australia OR "New England" OR Maine OR "USA" OR India OR Brazil OR "New South Wales" OR China OR Thailand OR America OR Philippines OR Nigeria OR Africa OR Holocene OR "New Caledonia" OR Greece OR Egypt OR Poland OR Cyprus OR Canada OR Ethiopia OR Amazonia OR Japan OR Italy OR Tunisia)) NOT ALL=("in vitro" OR "post-partum" OR laboratory OR "ecological restoration"))
	Identity	((((((ALL=(intertidal OR Subtidal OR seagrass OR maerl OR reef OR (deep sea habitat) OR marine)) AND ALL=(identit* OR belong* OR "sense of place" OR rootedness)) AND ALL=("ecosystem service*" OR "cultural ecosystem service*" OR "cultural service*" OR cultur*)) AND ALL=(Britain OR England OR Wales OR Scotland OR "UK" OR "United Kingdom" OR "Northern Ireland")) NOT ALL=(Australia OR "New England" OR Maine OR "USA" OR India OR Brazil OR "New South Wales" OR China OR Thailand OR America OR Philippines OR Nigeria OR Africa OR Holocene OR "New Caledonia" OR Greece OR Egypt OR Poland OR Cyprus OR Canada OR Ethiopia OR Amazonia OR Japan OR Italy OR Tunisia)) NOT ALL=("in vitro" OR "post-partum" OR laboratory))
Mountain and moorland	General	((((((ALL=(bog OR (dwarf shrub heath) OR (mountain heath) OR mountain OR (willow scrub) Or bracken OR swamps OR (upland fen) OR moor* OR heath OR montane OR peat OR (inland rock) OR scree OR ("above moorland line")) AND ALL=("cultural ecosystem service*" OR "cultural service*" OR cultur*)) AND ALL=(Britain OR England OR Wales OR Scotland OR "UK" OR "United Kingdom" OR "Northern Ireland")) NOT ALL=(Australia OR "New England" OR Maine OR "USA" OR India OR Brazil OR "New South Wales" OR China OR Thailand OR America OR Philippines OR Nigeria OR Africa OR Holocene OR "New Caledonia" OR Greece OR Egypt OR Poland OR Cyprus OR Canada OR Ethiopia OR Amazonia OR Japan OR Italy)) NOT ALL=(laboratory OR "bog bod*"))
	Experiential & physical use	(((ALL=(bog OR "dwarf shrub heath" OR "mountain heath" OR mountain OR "willow scrub" Or bracken OR swamps OR "upland fen" OR moor* OR heath OR montane OR peat OR "inland rock" OR scree OR "above moorland line") AND ALL=(experien* OR "physical use" OR visit OR volunteer* OR tourism OR ecotourism OR recreation OR sport OR activit* OR participat* OR access*)) AND ALL=("cultural ecosystem service*" OR "cultural service*" OR cultur*) AND ALL=(Britain OR England OR Wales OR Scotland OR "UK" OR "United Kingdom" OR "Northern Ireland")) NOT ALL=(Australia OR "New England" OR Maine OR "USA" OR India OR Brazil OR "New South Wales" OR China OR Thailand OR America OR Philippines OR Nigeria OR Africa OR Holocene OR "New Caledonia" OR Greece OR Egypt OR Poland OR Cyprus OR Canada OR Ethiopia OR Amazonia OR Japan OR Italy OR Tunisia OR Spain OR "South Korea" OR Nepal OR Mozambique) NOT ALL=(laboratory OR "bog bod*"))
	Scientific and educational	((((((ALL=(bog OR (dwarf shrub heath) OR (mountain heath) OR mountain OR (willow scrub) OR bracken OR swamps OR (upland fen) OR moor* OR heath OR montane OR peat OR (inland rock) OR scree OR ("above moorland line") AND ALL=(education* OR scien* OR "research project" OR "school visit" OR "citizen science" OR "skill development")) AND ALL=("cultural ecosystem service*" OR "cultural service*" OR cultur*)) AND ALL=(Britain OR England OR Wales OR Scotland OR "UK" OR "United Kingdom" OR "Northern Ireland")) NOT ALL=(Australia OR "New England" OR Maine OR "USA" OR India OR Brazil OR "New South Wales" OR China OR Thailand OR America OR Philippines OR Nigeria OR

		Africa OR Holocene OR "New Caledonia" OR Greece OR Egypt OR Poland OR Cyprus OR Canada OR Ethiopia OR Amazonia OR Japan)) NOT ALL=(laboratory OR "bog bod*" OR alcohol))
	Aesthetic	((((((ALL=(bog OR (dwarf shrub heath) OR (mountain heath) OR (willow scrub) OR mountain* bracken OR swamps OR (upland fen) OR moor* OR heath OR montane OR peat OR (inland rock) OR scree OR ("above moorland line")) AND ALL=(aesthetic* OR beaut* OR photo* OR "social media" OR appreciation OR "artistic representation")) AND ALL=("cultural ecosystem service*" OR "cultural service*" OR cultur*)) AND ALL=(Britain OR England OR Wales OR Scotland OR "UK" OR "United Kingdom" OR "Northern Ireland")) NOT ALL=(Australia OR "New England" OR Maine OR "USA" OR India OR Brazil OR "New South Wales" OR China OR Thailand OR America OR Philippines OR Nigeria OR Africa OR Holocene OR "New Caledonia" OR Greece OR Egypt OR Poland OR Cyprus OR Canada OR Ethiopia OR Amazonia OR Japan OR Italy OR Tunisia)) NOT ALL=(photosynthe* OR surgery OR photochemical OR laboratory OR childbirth OR "bog bod*"))
	Spiritual/emblematic	((((((ALL=(bog OR (dwarf shrub heath) OR (mountain heath) OR (willow scrub) OR mountain* OR bracken OR swamps OR (upland fen) OR moor* OR heath OR montane OR peat OR (inland rock) OR scree OR ("above moorland line")) AND ALL=(spirit* OR emblem* OR "traditional practice*" OR "traditional festival*" OR symbol* OR sacred)) AND ALL=("ecosystem service*" OR "cultural ecosystem service*" OR "cultural service*" OR cultur*)) AND ALL=(Britain OR England OR Wales OR Scotland OR "UK" OR "United Kingdom" OR "Northern Ireland")) NOT ALL=(Australia OR "New England" OR Maine OR "USA" OR India OR Brazil OR "New South Wales" OR China OR Thailand OR America OR Philippines OR Nigeria OR Africa OR Holocene OR "New Caledonia" OR Greece OR Egypt OR Poland OR Cyprus OR Canada OR Ethiopia OR Amazonia OR Japan OR Italy OR Tunisia)) NOT ALL=("in vitro" OR "post-partum" OR laboratory OR "bog bod*"))
		((((((ALL=(bog OR (dwarf shrub heath) OR (mountain heath) OR (willow scrub) OR mountain* OR bracken OR swamps OR (upland fen) OR moor* OR heath OR montane OR peat OR (inland rock) OR scree OR ("above moorland line")) AND ALL=(mindful* OR calm* OR restorat* OR tranquil* OR connect*)) AND ALL=("ecosystem service*" OR "cultural ecosystem service*" OR "cultural service*" OR cultur*)) AND ALL=(Britain OR England OR Wales OR Scotland OR "UK" OR "United Kingdom" OR "Northern Ireland")) NOT ALL=(Australia OR "New England" OR Maine OR "USA" OR India OR Brazil OR "New South Wales" OR China OR Thailand OR America OR Philippines OR Nigeria OR Africa OR Holocene OR "New Caledonia" OR Greece OR Egypt OR Poland OR Cyprus OR Canada OR Ethiopia OR Amazonia OR Japan OR Italy OR Tunisia)) NOT ALL=("in vitro" OR "post-partum" OR laboratory OR "bog bod*"))
	Identity	((((((ALL=(bog OR (dwarf shrub heath) OR (mountain heath) OR (willow scrub) OR mountain* OR bracken OR swamps OR (upland fen) OR moor* OR heath OR montane OR peat OR (inland rock) OR scree OR ("above moorland line")) AND ALL=(identit* OR belong* OR "sense of place" OR rootedness)) AND ALL=("ecosystem service*" OR "cultural ecosystem service*" OR "cultural service*" OR cultur*)) AND ALL=(Britain OR England OR Wales OR Scotland OR "UK" OR "United Kingdom" OR "Northern Ireland")) NOT ALL=(Australia OR "New England" OR Maine OR "USA" OR India

		OR Brazil OR "New South Wales" OR China OR Thailand OR America OR Philippines OR Nigeria OR Africa OR Holocene OR "New Caledonia" OR Greece OR Egypt OR Poland OR Cyprus OR Canada OR Ethiopia OR Amazonia OR Japan OR Italy OR Tunisia)) NOT ALL=("in vitro" OR "post-partum" OR laboratory OR "bog bod*"))
Enclosed farmland	General	(((((ALL=(farm* OR agricult* OR pasture OR arable OR livestock)) AND ALL=("cultural ecosystem service*" OR "cultural service*" OR cultur*)) AND ALL=(Britain OR England OR Wales OR Scotland OR "UK" OR "United Kingdom" OR "Northern Ireland")) NOT ALL=(Australia OR "New England" OR Maine OR "USA" OR India OR Brazil OR "New South Wales" OR China OR Thailand OR America OR Philippines OR Nigeria OR Africa OR Holocene OR "New Caledonia" OR Greece OR Egypt OR Poland OR Cyprus OR Canada OR Ethiopia OR Amazonia OR Japan OR Italy OR Tunisia OR Spain OR "South Korea" OR Nepal OR Mozambique OR balkans OR Iran)) NOT ALL=(laboratory OR paleoecology))
	Experiential & physical use	(((ALL=(farm* OR agricult* OR pasture OR arable OR livestock) AND ALL=(experien* OR "physical use" OR visit OR volunteer* OR tourism OR ecotourism OR recreation OR sport OR activit* OR participat* OR access*)) AND ALL=("cultural ecosystem service*" OR "cultural service*" OR cultur*) AND ALL=(Britain OR England OR Wales OR Scotland OR "UK" OR "United Kingdom" OR "Northern Ireland")) NOT ALL=(Australia OR "New England" OR Maine OR "USA" OR India OR Brazil OR "New South Wales" OR China OR Thailand OR America OR Philippines OR Nigeria OR Africa OR Holocene OR "New Caledonia" OR Greece OR Egypt OR Poland OR Cyprus OR Canada OR Ethiopia OR Amazonia OR Japan OR Italy OR Tunisia OR Spain OR "South Korea" OR Nepal OR Mozambique OR balkans OR Iran) NOT ALL=(laboratory OR paleoecology OR isotope*))
	Scientific and educational	(((ALL=(farm* OR agricult* OR pasture OR arable OR livestock) AND ALL=(education* OR scien* OR "research project" OR "school visit" OR "citizen science" OR "skill development")) AND ALL=("cultural ecosystem service*" OR "cultural service*" OR cultur*) AND ALL=(Britain OR England OR Wales OR Scotland OR "UK" OR "United Kingdom" OR "Northern Ireland")) NOT ALL=(Australia OR "New England" OR Maine OR "USA" OR India OR Brazil OR "New South Wales" OR China OR Thailand OR America OR Philippines OR Nigeria OR Africa OR Holocene OR "New Caledonia" OR Greece OR Egypt OR Poland OR Cyprus OR Canada OR Ethiopia OR Amazonia OR Japan OR Italy OR Tunisia OR Spain OR "South Korea" OR Nepal OR Mozambique OR balkans OR Iran) NOT ALL=(laboratory OR paleoecology OR isotope*))
	Aesthetic	(((((((ALL=(bog OR (dwarf shrub heath) OR (mountain heath) OR (willow scrub) OR mountain* bracken OR swamps OR (upland fen) OR moor* OR heath OR montane OR peat OR (inland rock) OR scree OR ("above moorland line")) AND ALL=(aesthetic* OR beaut* OR photo* OR "social media" OR appreciation OR "artistic representation")) AND ALL=("cultural ecosystem service*" OR "cultural service*" OR cultur*)) AND ALL=(Britain OR England OR Wales OR Scotland OR "UK" OR "United Kingdom" OR "Northern Ireland")) NOT ALL=(Australia OR "New England" OR Maine OR "USA" OR India OR Brazil OR "New South Wales" OR China OR Thailand OR America OR Philippines OR Nigeria OR Africa OR Holocene OR "New Caledonia" OR Greece OR Egypt OR Poland OR Cyprus OR Canada OR Ethiopia OR

		Amazonia OR Japan OR Italy OR Tunisia)) NOT ALL=(photosynthe* OR surgery OR photochemical OR laboratory OR childbirth OR "bog bod*"))
	Spiritual/emblematic	(((ALL=(farm* OR grassland OR agricult* OR pasture OR arable OR livestock) AND ALL=(spirit* OR emblem* OR "traditional practice*" OR "traditional festival*" OR symbol* OR sacred)) AND ALL=("cultural ecosystem service*" OR "cultural service*" OR cultur*) AND ALL=(Britain OR England OR Wales OR Scotland OR "UK" OR "United Kingdom" OR "Northern Ireland")) NOT ALL=(Australia OR "New England" OR Maine OR "USA" OR India OR Brazil OR "New South Wales" OR China OR Thailand OR America OR Philippines OR Nigeria OR Africa OR Holocene OR "New Caledonia" OR Greece OR Egypt OR Poland OR Cyprus OR Canada OR Ethiopia OR Amazonia OR Japan OR Italy OR Tunisia OR Spain OR "South Korea" OR Nepal OR Mozambique OR balkans OR Iran) NOT ALL=(laboratory OR paleoecology OR isotope*))
		(((ALL=(farm* OR grassland OR agricult* OR pasture OR arable OR livestock) AND ALL=(mindful* OR calm* OR restorat* OR tranquil* OR connect*)) AND ALL=("cultural ecosystem service*" OR "cultural service*" OR cultur*) AND ALL=(Britain OR England OR Wales OR Scotland OR "UK" OR "United Kingdom" OR "Northern Ireland")) NOT ALL=(Australia OR "New England" OR Maine OR "USA" OR India OR Brazil OR "New South Wales" OR China OR Thailand OR America OR Philippines OR Nigeria OR Africa OR Holocene OR "New Caledonia" OR Greece OR Egypt OR Poland OR Cyprus OR Canada OR Ethiopia OR Amazonia OR Japan OR Italy OR Tunisia OR Spain OR "South Korea" OR Nepal OR Mozambique OR balkans OR Iran) NOT ALL=(laboratory OR paleoecology OR isotope*))
	Identity	(((ALL=(farm* OR grassland OR agricult* OR pasture OR arable OR livestock) AND ALL=(identit* OR belong* OR "sense of place" OR rootedness)) AND ALL=("cultural ecosystem service*" OR "cultural service*" OR cultur*) AND ALL=(Britain OR England OR Wales OR Scotland OR "UK" OR "United Kingdom" OR "Northern Ireland")) NOT ALL=(Australia OR "New England" OR Maine OR "USA" OR India OR Brazil OR "New South Wales" OR China OR Thailand OR America OR Philippines OR Nigeria OR Africa OR Holocene OR "New Caledonia" OR Greece OR Egypt OR Poland OR Cyprus OR Canada OR Ethiopia OR Amazonia OR Japan OR Italy OR Tunisia OR Spain OR "South Korea" OR Nepal OR Mozambique OR balkans OR Iran) NOT ALL=(laboratory OR paleoecology OR isotope*))
Semi-natural grassland	General	(((ALL=(grassland OR meadow* OR moor-grass OR "rush pasture") AND ALL=("cultural ecosystem service*" OR "cultural service*" OR cultur*) AND ALL=(Britain OR England OR Wales OR Scotland OR "UK" OR "United Kingdom" OR "Northern Ireland")) NOT ALL=(Australia OR "New England" OR Maine OR "USA" OR India OR Brazil OR "New South Wales" OR China OR Thailand OR America OR Philippines OR Nigeria OR Africa OR Holocene OR "New Caledonia" OR Greece OR Egypt OR Poland OR Cyprus OR Canada OR Ethiopia OR Amazonia OR Japan OR Italy OR Tunisia OR Spain OR "South Korea" OR Nepal OR Mozambique OR balkans OR Iran) NOT ALL=(laboratory)))
	Experiential & physical use	(((ALL=(grassland* OR meadow* OR moor-grass OR "rush pasture") AND ALL=(experien* OR "physical use" OR visit OR volunteer* OR tourism OR ecotourism OR recreation OR sport OR activit* OR participat* OR access*) AND ALL=("cultural ecosystem service*" OR "cultural service*" OR cultur*) AND ALL=(Britain OR England OR Wales OR

		Scotland OR "UK" OR "United Kingdom" OR "Northern Ireland")) NOT ALL=(Australia OR "New England" OR Maine OR "USA" OR India OR Brazil OR "New South Wales" OR China OR Thailand OR America OR Philippines OR Nigeria OR Africa OR Holocene OR "New Caledonia" OR Greece OR Egypt OR Poland OR Cyprus OR Canada OR Ethiopia OR Amazonia OR Japan OR Italy OR Tunisia OR Spain OR "South Korea" OR Nepal OR Mozambique OR balkans OR Iran) NOT ALL=(laboratory)))
	Scientific and educational	(((ALL=(farm* OR grassland OR agricult* OR pasture OR arable OR livestock) AND ALL=(education* OR scien* OR "research project" OR "school visit" OR "citizen science" OR "skill development")) AND ALL=("cultural ecosystem service*" OR "cultural service*" OR cultur*) AND ALL=(Britain OR England OR Wales OR Scotland OR "UK" OR "United Kingdom" OR "Northern Ireland")) NOT ALL=(Australia OR "New England" OR Maine OR "USA" OR India OR Brazil OR "New South Wales" OR China OR Thailand OR America OR Philippines OR Nigeria OR Africa OR Holocene OR "New Caledonia" OR Greece OR Egypt OR Poland OR Cyprus OR Canada OR Ethiopia OR Amazonia OR Japan OR Italy OR Tunisia OR Spain OR "South Korea" OR Nepal OR Mozambique OR balkans OR Iran) NOT ALL=(laboratory OR paleoecology OR isotope*))
	Aesthetic	(((ALL=(grassland* OR meadow* OR moor-grass OR "rush pasture") AND ALL=(aesthetic* OR beaut* OR photo* OR "social media" OR appreciation OR "artistic representation") AND ALL=("cultural ecosystem service*" OR "cultural service*" OR cultur*) AND ALL=(Britain OR England OR Wales OR Scotland OR "UK" OR "United Kingdom" OR "Northern Ireland")) NOT ALL=(Australia OR "New England" OR Maine OR "USA" OR India OR Brazil OR "New South Wales" OR China OR Thailand OR America OR Philippines OR Nigeria OR Africa OR Holocene OR "New Caledonia" OR Greece OR Egypt OR Poland OR Cyprus OR Canada OR Ethiopia OR Amazonia OR Japan OR Italy OR Tunisia OR Spain OR "South Korea" OR Nepal OR Mozambique OR balkans OR Iran) NOT ALL=(laboratory)))
	Spiritual/emblematic	(((ALL=(grassland* OR meadow* OR moor-grass OR "rush pasture") AND ALL=(spirit* OR emblem* OR "traditional practice*" OR "traditional festival*" OR symbol* OR sacred) AND ALL=("cultural ecosystem service*" OR "cultural service*" OR cultur*) AND ALL=(Britain OR England OR Wales OR Scotland OR "UK" OR "United Kingdom" OR "Northern Ireland")) NOT ALL=(Australia OR "New England" OR Maine OR "USA" OR India OR Brazil OR "New South Wales" OR China OR Thailand OR America OR Philippines OR Nigeria OR Africa OR Holocene OR "New Caledonia" OR Greece OR Egypt OR Poland OR Cyprus OR Canada OR Ethiopia OR Amazonia OR Japan OR Italy OR Tunisia OR Spain OR "South Korea" OR Nepal OR Mozambique OR balkans OR Iran) NOT ALL=(laboratory)))
		(((ALL=(grassland* OR meadow* OR moor-grass OR "rush pasture") AND ALL=(mindful* OR calm* OR restorat* OR tranquil* OR connect*) AND ALL=("cultural ecosystem service*" OR "cultural service*" OR cultur*) AND ALL=(Britain OR England OR Wales OR Scotland OR "UK" OR "United Kingdom" OR "Northern Ireland")) NOT ALL=(Australia OR "New England" OR Maine OR "USA" OR India OR Brazil OR "New South Wales" OR China OR Thailand OR America OR Philippines OR Nigeria OR Africa OR Holocene OR "New Caledonia" OR Greece OR Egypt OR Poland OR Cyprus OR

		Canada OR Ethiopia OR Amazonia OR Japan OR Italy OR Tunisia OR Spain OR "South Korea" OR Nepal OR Mozambique OR balkans OR Iran) NOT ALL=(laboratory)))
	Identity	(((ALL=(grassland* OR meadow* OR moor-grass OR "rush pasture") AND ALL=(identit* OR belong* OR "sense of place" OR rootedness) AND ALL=("cultural ecosystem service*" OR "cultural service*" OR cultur*) AND ALL=(Britain OR England OR Wales OR Scotland OR "UK" OR "United Kingdom" OR "Northern Ireland")) NOT ALL=(Australia OR "New England" OR Maine OR "USA" OR India OR Brazil OR "New South Wales" OR China OR Thailand OR America OR Philippines OR Nigeria OR Africa OR Holocene OR "New Caledonia" OR Greece OR Egypt OR Poland OR Cyprus OR Canada OR Ethiopia OR Amazonia OR Japan OR Italy OR Tunisia OR Spain OR "South Korea" OR Nepal OR Mozambique OR balkans OR Iran) NOT ALL=(laboratory)))
Urban	General	(((ALL=(((urban OR city) AND (greenspace OR "green space" OR forest OR (street trees) OR "domestic gardens" OR "green corridors" OR allotment OR cemeteries OR churchyard OR greenbelt OR "green belt" OR green OR park OR woodland OR vegetation OR (canopy) OR parkland OR wood))) AND ALL=("cultural ecosystem service*" OR "cultural service*" OR cultur*) AND ALL=(Britain OR England OR Wales OR Scotland OR "UK" OR "United Kingdom" OR "Northern Ireland")) NOT ALL=(Australia OR "New England" OR Maine OR "USA" OR India OR Brazil OR "New South Wales" OR China OR Thailand OR America OR Philippines OR Nigeria OR Africa OR Holocene OR "New Caledonia" OR Greece OR Egypt OR Poland OR Cyprus OR Canada OR Ethiopia OR Amazonia OR Japan OR Italy OR Tunisia OR Spain OR "South Korea" OR Nepal OR Mozambique OR balkans OR Iran) NOT ALL=(laboratory)))
	Experiential & physical use	(((ALL=(grassland* OR meadow* OR moor-grass OR "rush pasture") AND ALL=(experien* OR "physical use" OR visit OR volunteer* OR tourism OR ecotourism OR recreation OR sport OR activit* OR participat* OR access*) AND ALL=("cultural ecosystem service*" OR "cultural service*" OR cultur*) AND ALL=(Britain OR England OR Wales OR Scotland OR "UK" OR "United Kingdom" OR "Northern Ireland")) NOT ALL=(Australia OR "New England" OR Maine OR "USA" OR India OR Brazil OR "New South Wales" OR China OR Thailand OR America OR Philippines OR Nigeria OR Africa OR Holocene OR "New Caledonia" OR Greece OR Egypt OR Poland OR Cyprus OR Canada OR Ethiopia OR Amazonia OR Japan OR Italy OR Tunisia OR Spain OR "South Korea" OR Nepal OR Mozambique OR balkans OR Iran) NOT ALL=(laboratory)))
	Scientific and educational	(((ALL=(((urban OR city) AND (greenspace OR "green space" OR forest OR (street trees) OR "domestic gardens" OR "green corridors" OR allotment OR cemeteries OR churchyard OR greenbelt OR "green belt" OR green OR park OR woodland OR vegetation OR (canopy) OR parkland OR wood))) AND ALL=(education* OR scien* OR "research project" OR "school visit" OR "citizen science" OR "skill development") AND ALL=("cultural ecosystem service*" OR "cultural service*" OR cultur*) AND ALL=(Britain OR England OR Wales OR Scotland OR "UK" OR "United Kingdom" OR "Northern Ireland")) NOT ALL=(Australia OR "New England" OR Maine OR "USA" OR India OR Brazil OR "New South Wales" OR China OR Thailand OR America OR Philippines OR Nigeria OR Africa OR Holocene OR "New Caledonia" OR

		Greece OR Egypt OR Poland OR Cyprus OR Canada OR Ethiopia OR Amazonia OR Japan OR Italy OR Tunisia OR Spain OR "South Korea" OR Nepal OR Mozambique OR balkans OR Iran) NOT ALL=(laboratory)))
	Aesthetic	(((ALL=(((urban OR city) AND (greenspace OR "green space" OR forest OR (street trees) OR "domestic gardens" OR "green corridors" OR allotment OR cemeteries OR churchward OR greenbelt OR "green belt" OR green OR park OR woodland OR vegetation OR (canopy) OR parkland OR wood))) AND ALL=(aesthetic* OR beaut* OR photo* OR "social media" OR appreciation OR "artistic representation") AND ALL=("cultural ecosystem service*" OR "cultural service*" OR cultur*) AND ALL=(Britain OR England OR Wales OR Scotland OR "UK" OR "United Kingdom" OR "Northern Ireland")) NOT ALL=(Australia OR "New England" OR Maine OR "USA" OR India OR Brazil OR "New South Wales" OR China OR Thailand OR America OR Philippines OR Nigeria OR Africa OR Holocene OR "New Caledonia" OR Greece OR Egypt OR Poland OR Cyprus OR Canada OR Ethiopia OR Amazonia OR Japan OR Italy OR Tunisia OR Spain OR "South Korea" OR Nepal OR Mozambique OR balkans OR Iran) NOT ALL=(laboratory)))
	Spiritual/emblematic	(((ALL=(((urban OR city) AND (greenspace OR "green space" OR forest OR (street trees) OR "domestic gardens" OR "green corridors" OR allotment OR cemeteries OR churchward OR greenbelt OR "green belt" OR green OR park OR woodland OR vegetation OR (canopy) OR parkland OR wood))) AND ALL=(spirit* OR emblem* OR "traditional practice*" OR "traditional festival*" OR symbol* OR sacred) AND ALL=("cultural ecosystem service*" OR "cultural service*" OR cultur*) AND ALL=(Britain OR England OR Wales OR Scotland OR "UK" OR "United Kingdom" OR "Northern Ireland")) NOT ALL=(Australia OR "New England" OR Maine OR "USA" OR India OR Brazil OR "New South Wales" OR China OR Thailand OR America OR Philippines OR Nigeria OR Africa OR Holocene OR "New Caledonia" OR Greece OR Egypt OR Poland OR Cyprus OR Canada OR Ethiopia OR Amazonia OR Japan OR Italy OR Tunisia OR Spain OR "South Korea" OR Nepal OR Mozambique OR balkans OR Iran) NOT ALL=(laboratory)))
		(((ALL=(((urban OR city) AND (greenspace OR "green space" OR forest OR (street trees) OR "domestic gardens" OR "green corridors" OR allotment OR cemeteries OR churchward OR greenbelt OR "green belt" OR green OR park OR woodland OR vegetation OR (canopy) OR parkland OR wood))) AND ALL=(mindful* OR calm* OR restorat* OR tranquil* OR connect*) AND ALL=("cultural ecosystem service*" OR "cultural service*" OR cultur*) AND ALL=(Britain OR England OR Wales OR Scotland OR "UK" OR "United Kingdom" OR "Northern Ireland")) NOT ALL=(Australia OR "New England" OR Maine OR "USA" OR India OR Brazil OR "New South Wales" OR China OR Thailand OR America OR Philippines OR Nigeria OR Africa OR Holocene OR "New Caledonia" OR Greece OR Egypt OR Poland OR Cyprus OR Canada OR Ethiopia OR Amazonia OR Japan OR Italy OR Tunisia OR Spain OR "South Korea" OR Nepal OR Mozambique OR balkans OR Iran) NOT ALL=(laboratory)))
	Identity	(((ALL=(((urban OR city) AND (greenspace OR "green space" OR forest OR (street trees) OR "domestic gardens" OR "green corridors" OR allotment OR cemeteries OR churchward OR greenbelt OR "green belt" OR green OR park OR woodland OR vegetation OR (canopy) OR parkland OR wood))) AND ALL=(identit* OR belong* OR "sense of place" OR rootedness) AND ALL=("cultural ecosystem service*" OR "cultural service*" OR cultur*) AND ALL=(Britain OR England

		OR Wales OR Scotland OR "UK" OR "United Kingdom" OR "Northern Ireland")) NOT ALL=(Australia OR "New England" OR Maine OR "USA" OR India OR Brazil OR "New South Wales" OR China OR Thailand OR America OR Philippines OR Nigeria OR Africa OR Holocene OR "New Caledonia" OR Greece OR Egypt OR Poland OR Cyprus OR Canada OR Ethiopia OR Amazonia OR Japan OR Italy OR Tunisia OR Spain OR "South Korea" OR Nepal OR Mozambique OR balkans OR Iran) NOT ALL=(laboratory)))

Annex 2 – Search string: health and wellbeing benefits

Broad Habitat Type	Search string
General	biodiversity OR "natural environment" (Topic) and health OR wellbeing OR well-being OR "well being" (Topic) and "systematic review" (Topic) and Review Articles (Document Types)
Woodland	woodland OR conifer* OR broadleaved OR yew OR deciduous OR beech OR ash OR oak OR birch OR pine OR forest (Topic) and health OR wellbeing OR well-being OR "well being" (Topic) and "systematic review" (Topic) and Review Articles (Document Types)
Coastal Margins	coast* OR dune OR "salt marsh" OR saltmarsh OR "mud flat" OR mudflat OR beach OR shingle (Topic) and health OR wellbeing OR well-being OR "well being" (Topic) and "systematic review" (Topic) and Review Articles (Document Types) and Review Articles (Document Types)
Freshwater	"Lowland fens" OR "Lowland raised bogs" OR "Reed beds" OR Reedbeds OR freshwater OR river OR pond OR "grazing marsh" OR peat (Topic) and health OR wellbeing OR well-being OR "well being" (Topic) and "systematic review" (Topic) and Review Articles (Document Types)
Marine	intertidal OR Subtidal OR seagrass OR maerl OR reef OR (deep sea habitat) OR marine (Topic) and health OR wellbeing OR well-being OR "well being" (Topic) and "systematic review" (Topic) and Review Articles (Document Types)
Mountain, moorland and heath	bog OR "dwarf shrub heath" OR "mountain heath" OR mountain OR "willow scrub" Or bracken OR swamps OR "upland fen" OR moor* OR heath OR montane OR peat OR "inland rock" OR scree OR "above moorland line" (Topic) and health OR wellbeing OR well-being OR "well being" (Topic) and "systematic review" (Topic) and Review Articles (Document Types)
Enclosed farmland	farm* OR agricult* OR pasture OR arable OR livestock (Topic) and health OR wellbeing OR well-being OR "well being" (Topic) and "systematic review" (Topic) and Review Articles (Document Types)
Semi-natural grasslands	grassland OR meadow* OR moor-grass OR "rush pasture" (Topic) and health OR wellbeing OR well-being OR "well being" (Topic) and "systematic review" (Topic) and Review Articles (Document Types)
Urban	urban OR city (Topic) and greenspace OR "green space" OR forest OR "street trees" OR "domestic gardens" OR "green corridors" OR allotment OR cemeteries OR churchyard OR greenbelt OR "green belt" OR green OR park OR woodland OR vegetation OR canopy OR parkland OR wood (Topic) and health OR wellbeing OR well-being OR "well being" (Topic) and "systematic review" (Topic) and Review Articles (Document Types)