

# **How participatory GIS can help integrate people's cultural values into landscape planning**

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**Through a research study funded by Natural England, The Research Box and ADAS have sought to improve understanding of how the general public perceive and value landscape and ecology by developing a web-based tool to capture these values spatially, allowing their integration into decision-making alongside traditional environment data. The purpose of this article is to encourage ecologists and environment managers to seek greater public engagement in landscape planning.**

In 2013, Natural England commissioned The Research Box and the Cambridge Centre for Landscape and People to carry out a pilot study (Inwood et al., 2015) to test different ways of capturing people's perceptions in the context of a potential ecological network in the Greensand Ridge Nature Improvement Area (NIA). The study found that members of the public could separately identify individual cultural services (such as inspiration, beauty, tranquillity and the presence of wildlife) and locate these on a map. In late 2014, a second pilot study was commissioned in the Morecambe Bay area to build on these findings and to develop practical advice and guidance as to how cultural service information gathered from the public could best be used alongside natural environment data in landscape planning and decision-making.

## **Study approach**

The study was carried out in three areas in and around Morecambe Bay – the Duddon Valley, the Arnside & Silverdale AONB and the Heysham-Morecambe-Lancaster triangle. In each study area, a participatory workshop was held, with participants invited beforehand to

use one of two methods for capturing their experiences of the landscape and for geolocating these 'cultural services' – a Participatory GIS (PGIS) tool and a Landscape App.

The PGIS tool operated as an interactive website that could be remotely accessed by the public. The tool captured simple information about the user, including respondent demographic profile details (age, gender, home postcode) the frequency and purpose of their outdoor visits and their environmental affiliations (e.g. wildlife memberships or land-based employment). A series of zoomable Ordnance Survey and satellite maps were provided on which people could place digital pins that denote locations where they experience cultural services. The cultural services examined in the tool comprised an agreed set of five themes: active outdoor recreation (walking, cycling, etc); local history, heritage and learning; solitude, calm and tranquillity; beauty and inspiration; and wildlife and nature.

People were able to place as many pins as they wished within the map area (recorded as lat/long coordinates), with the zoom function enabling them to identify a detailed location or a more 'fuzzy' locality. In addition to placing pins on the PGIS maps, people were able to record free-form notes against the pin locations to give an indication of the activities they undertake there, any landscape features of particular note, and the reasons why they find the place so special. The website also provided the ability to upload pictures that users may have taken of the place of interest.

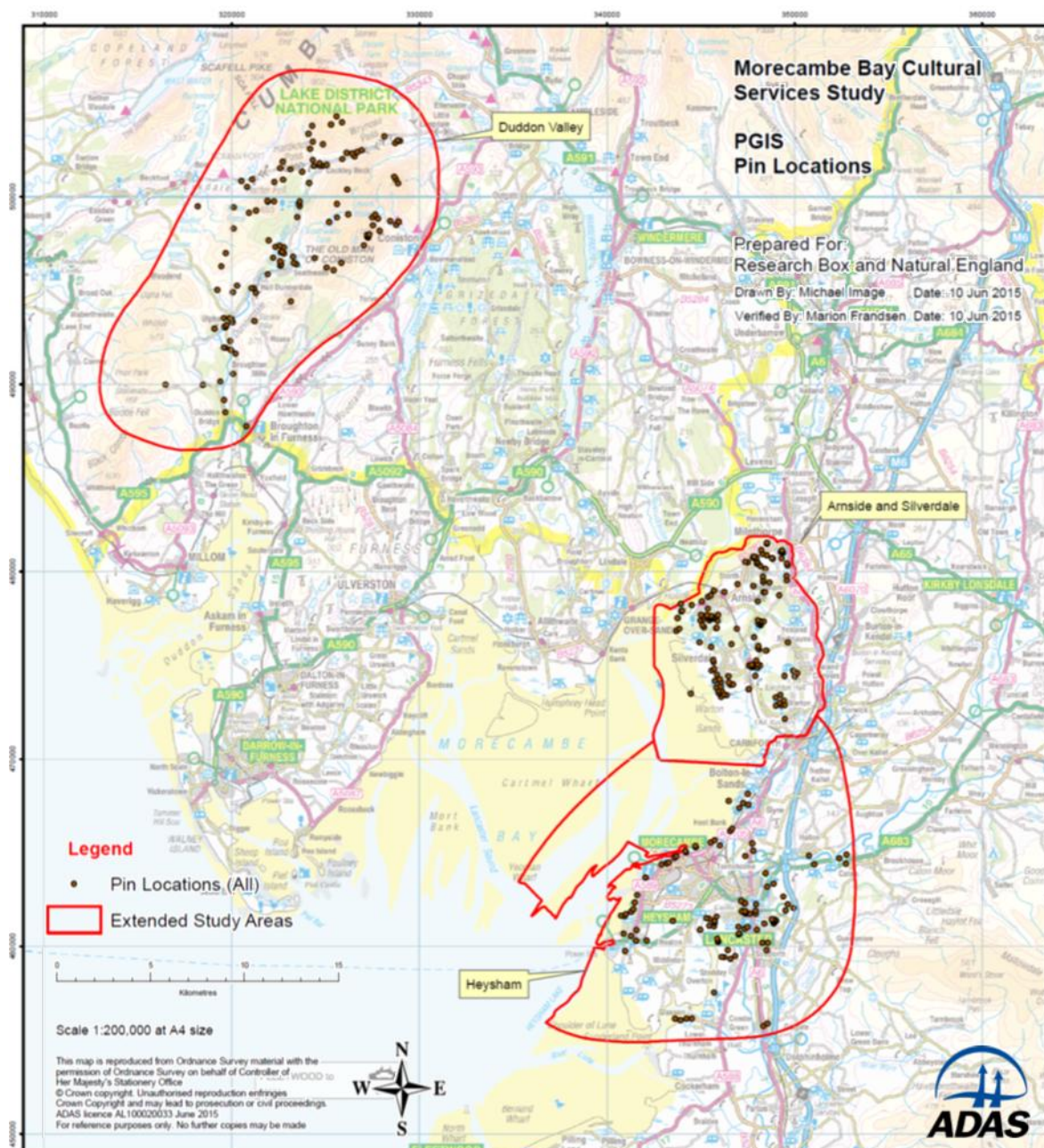
The Landscape App used in this study was an adaptation of commercially-available survey software, designed to capture the locations of people's cultural values in the field – for example when they were walking, riding or cycling in the countryside. The App asked the user a series of questions about their experiences within the landscape, with answers provided on a 1-5 scale, and automatically logged the physical location (lat/long coordinates) where those experiences were recorded (using the GPS within the mobile device).

The participants for the three workshops comprised a mix of socio-economic groups, gender and age. They came from different towns, villages and rural locations within the locality and either lived or worked within the study area, or visited the area for recreation. In each workshop, three broad topic areas were covered during the discussion: cultural-value locations and why they are special; participants' experiences of using the PGIS tool and/or App; and potential landscape changes and people's reactions to them. The potential landscape changes included the planting of woodland on existing fell-land; the replacement of coniferous woodland with deciduous woodland; the need for industrial and housing development through infill or on greenfield land; managed coastal retreat; and improvements to degraded landscapes within the urban fringe.

## Findings of the PGIS tool

The PGIS tool provided a total of 385 location pins eligible for statistical and spatial analysis, placed by 46 users. A map of the pin locations in the three focus areas is shown in Fig. 1. In terms of the cultural services that the PGIS users selected as being important through their placement of pins, 50% of pins were for outdoors recreation; 16% for solitude, calm and tranquillity; 14% for wildlife and nature; 12% for beauty and inspiration; and 9% for local history, heritage and learning.

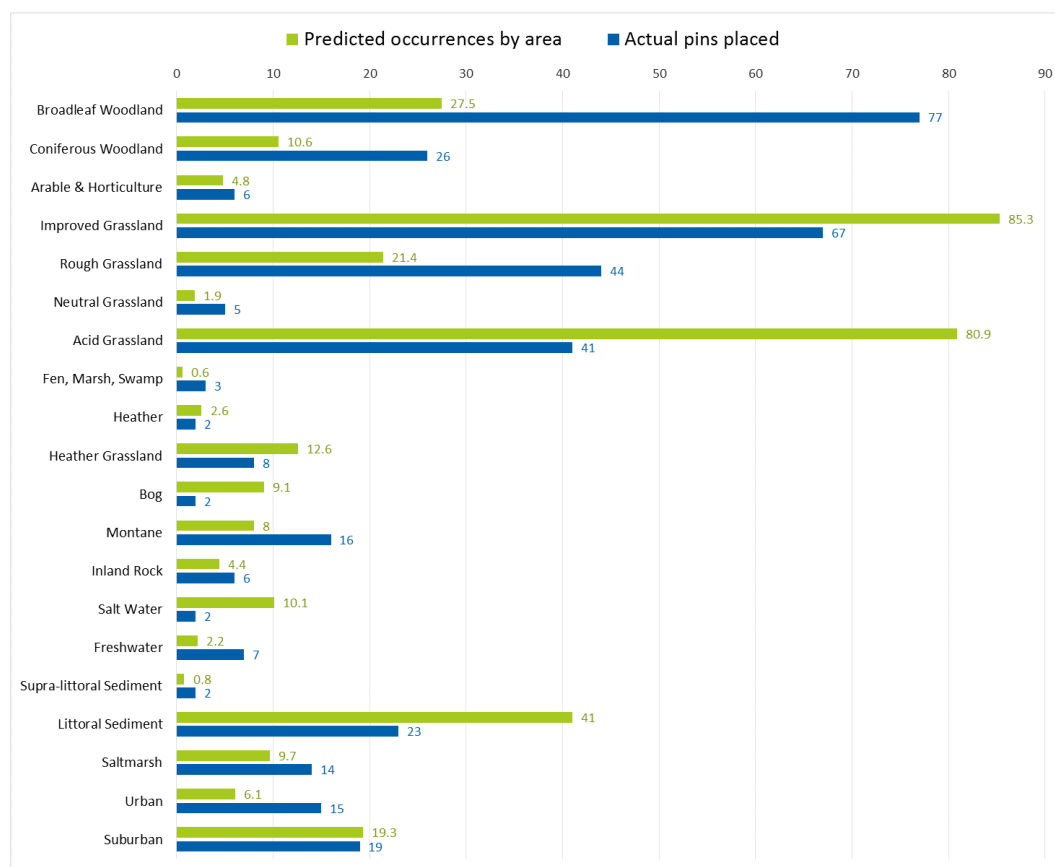
Fig. 1 – PGIS pin locations



## Relationship between cultural ecosystem services and land cover classes

Analysis was undertaken of the correlation between pin locations and land cover classes in order to identify those that were selected more or less often than would be predicted by their surface area if all pins were placed randomly (significant at the 5% level). The results showed that broadleaf and coniferous woodlands, rough and neutral grasslands, fen/marsh/swamp, montane, freshwater, supra-littoral sediment and urban land cover classes were particularly popular with the PGIS respondents. Graphical representation of the expected versus actual number of pins placed in each land cover type can be seen in Fig. 2.

*Fig. 2 – Land cover types represented by the pins compared to their actual presence in the study areas*



Looking at the cultural services individually, it was clear from the PGIS data that these are enjoyed more in certain land cover types than in others. For example, though 14% of the overall pins were allocated to 'wildlife and nature', the proportion is noticeably higher for heather grassland (at 38%) and neutral grassland (20%) compared to other land cover types. At the other end of the scale, and perhaps unsurprisingly, only 7% of pins in urban land cover were assigned to this service. Interestingly, a high proportion of pins placed in broadleaf woodland were attributable to 'wildlife and nature' (17%), whereas only 8% of pins

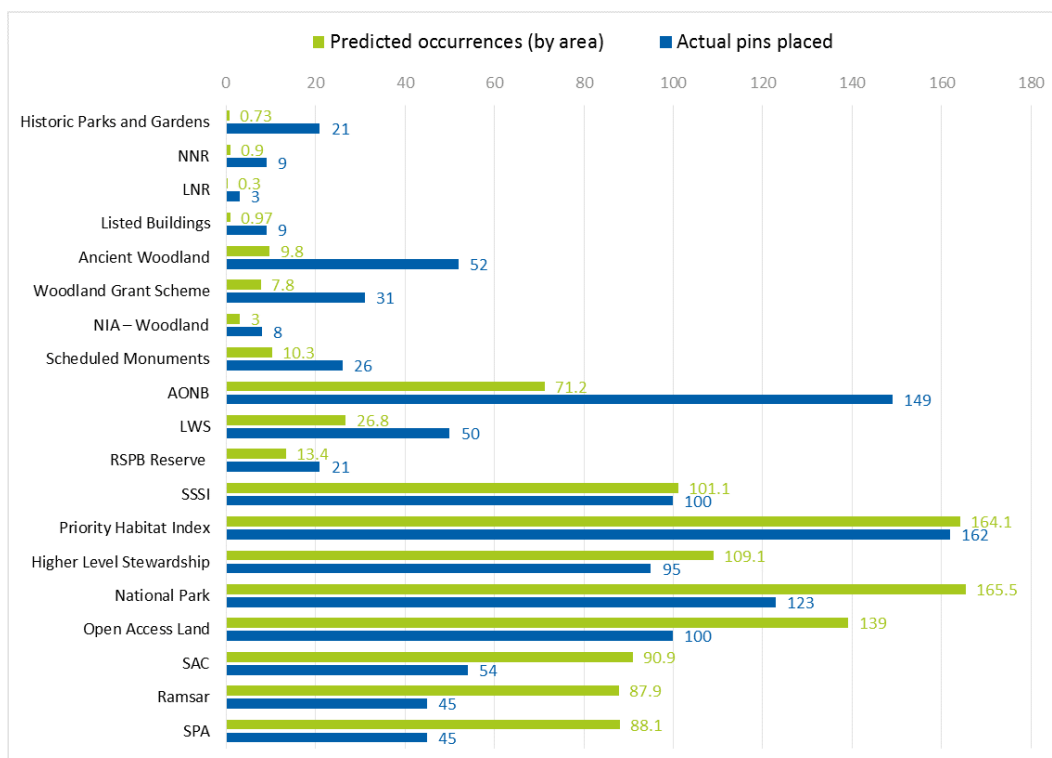
in coniferous woodland were. This suggests that the relationship between biodiversity and habitat type is recognised by the general public.

A sense of local history was more frequently experienced in neutral grassland, inland rock, saltwater, and urban land cover types. Tranquillity was typically associated with heather, bog, freshwater and coastal habitats. Land cover types well represented for outdoors recreation were arable and horticulture, sand dunes, and suburban. Beauty and inspiration was most often felt in heather grassland and montane areas.

### Relationship between cultural ecosystem services and environment datasets

The same correlation analysis was then performed between pin locations and available environment datasets (i.e. land under some form of conservation management or environmental designation). Datasets showing statistically significant positive correlation (at the 5% level) with pin location, i.e. those for which far more pins were placed than would be predicted by their surface area if all pins were placed randomly, are shown at the top of Fig. 3 (up to and including RSPB Reserve). Datasets for which few fewer pins were placed than would be expected (significant at the 5% level) are shown at the bottom (National Park onwards).

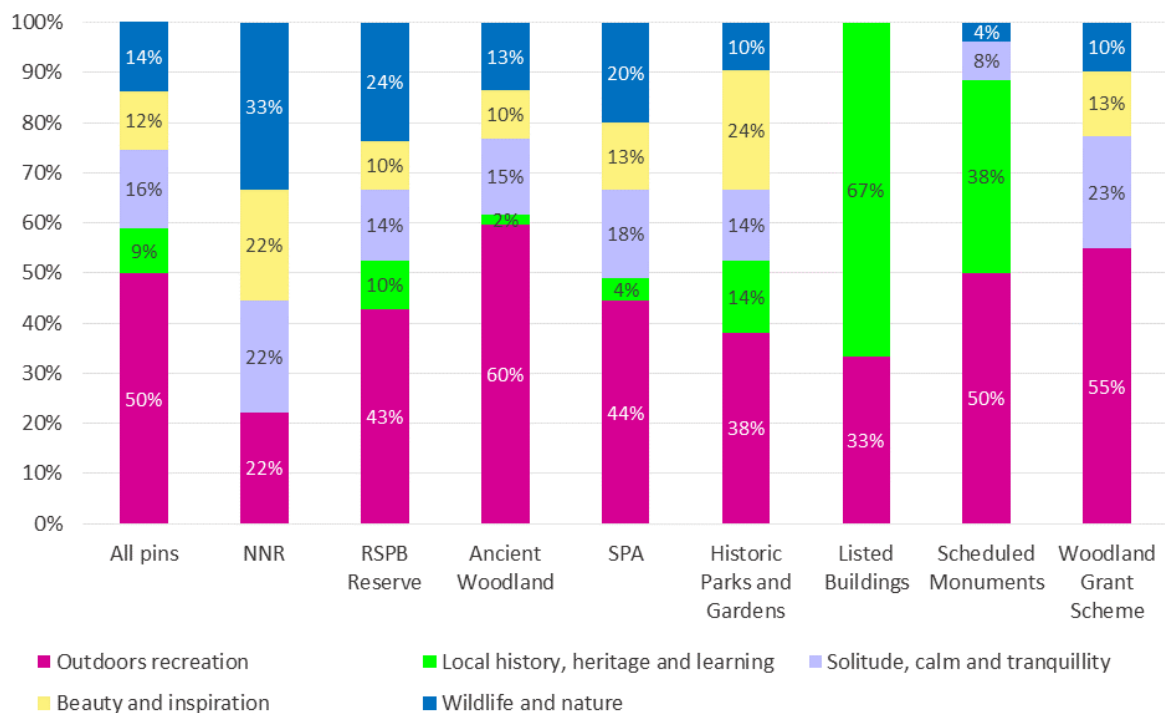
*Fig. 3 – Environment datasets represented by the pins compared to their actual presence in the study areas*



Further analysis of these datasets was undertaken to investigate the different cultural services people experience in these areas.

The CES benefit ‘wildlife and nature’ was positively correlated with the NNR, RSPB reserve, land under higher level stewardship (HLS), ancient woodland, LWS and land under woodland grant scheme (WGS) datasets, which are typically associated with rich biodiversity, and also the AONB and historic parks and gardens datasets, where the public can connect with nature. A sense of local history was unsurprisingly correlated with the listed building, scheduled monument, and historic parks and garden datasets. Tranquillity was positively linked with the datasets for NNR, land under WGS, ancient woodland, AONB, and historic parks and gardens. A total of 11 of the 19 environment datasets were positively correlated with outdoors recreation, with NIA Woodland and LNR having a particularly high proportions of recreation pins. Beauty and inspiration was positively correlated with the NNR, SAC, historic parks and gardens, ancient woodland, AONB, and land under WGS datasets. The breakdown across CES categories for a selection of environment datasets can be seen in Fig. 4, with the breakdown for ‘all pins’ shown in the leftmost column as a comparison.

Fig. 4 – Breakdown of CES categories for selected environment datasets



### Relationship between cultural ecosystem services and areas devoid of environment data

As areas of land with environmental designations or known conservation management are generally already taken into consideration in planning decisions, it was considered necessary to identify areas of the Morecambe Bay study area where people placed pins but which are not covered by any environment dataset. This only applied to the Heysham-Morecambe-Lancaster triangle, where approximately 35% of the 116 pins were placed in areas with no environment dataset coverage. These pins largely related to the cultural ecosystem service (CES) benefits of 'solitude, calm and tranquillity', 'beauty and inspiration', and 'local history, heritage and learning'.

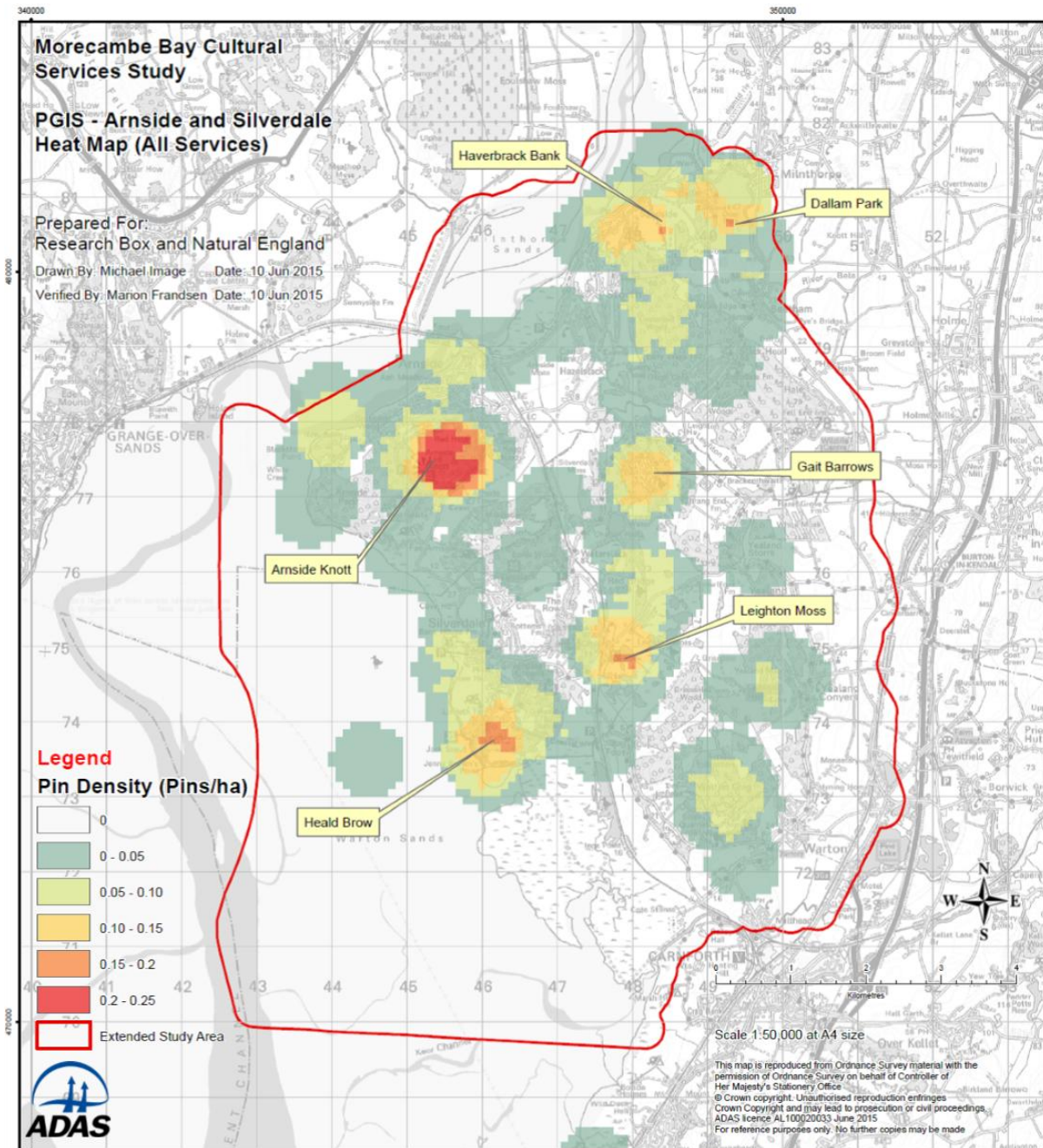
### Shared cultural values of PGIS users

The placing of pins using the PGIS tool was carried out by people independently of each other. Those subsequently attending one of the three participatory workshops were able to see an amalgamation of all their pins presented together on one map, and then discussed together how consistent their PGIS choices were. In order to spatially represent this 'shared value' (i.e. locations that were considered to be special by multiple users), it was considered useful to produce heat maps to explore the spatial density of cultural service distribution. These heat maps show the number of pins per hectare in a colour schematic where each hectare cell is shaded redder for higher density and greener for lower density. Where no pins are present (i.e. density is zero) no colour has been applied.

The heat maps revealed a particularly high density of pins in an area known as Arnside Knott within the Arnside & Silverdale AONB, and in Williamson Park in the Heysham-Morecambe-Lancaster triangle (both with approx. 0.25 pins/hectare). Three other sites within these two study areas also had densities of up to 0.2 pins/hectare. By contrast, the highest density of pins anywhere in the Duddon Valley was only 0.13 pins/hectare, around the Old Man of Coniston – possibly because the landscape of this study area has broader appeal. The heat map for the Arnside & Silverdale AONB study area is shown in Fig. 5.

*Fig. 5 – Heat map showing shared cultural values in Arnside & Silverdale AONB*





### Incorporating the public's cultural value information into decision-making

Due to their qualitative and intangible nature, CES tend to be overlooked in decision-making. The mapping of CES using PGIS and other tools is therefore increasingly being used as a means of showing the value of specific geographical areas to people. However, so far there is little evidence that mapped cultural value data has actually been used in decision-making (Brown and Fagerholm, 2015). For PGIS tools to have real influence, it is crucial that those in power “accept that lay segments of society have valuable knowledge and experiences, beyond mass opinion, that can substantively contribute to land planning and management



*decisions*" (Brown and Kyttä, 2014). It is also important that trade-offs and conflicts between different ecosystem services and land uses are understood.

Based on the data obtained through the Morecambe Bay pilot study, general recommendations for incorporating people's cultural values into local decision-making are described as follows.

Firstly, to avoid potential criticism of the data being subjective, any CES dataset needs to be large and representative. It is recommended that local authorities try to collect pin data from all sectors of society across the whole district, borough or city (and beyond into neighbouring authorities where appropriate). The process used to obtain data from the public needs to be democratic, particularly involving groups who are rarely engaged with the planning system, and those who may face social, physical, or physiological barriers to engaging with the outdoors or to using computers. This will also enable the avoidance of 'white spaces' on a pin map (i.e. missing data) that may otherwise be perceived as having no cultural value.

Once the CES dataset has been created, this should be added to the authority's GIS database. It could then be used in much the same way as the other GIS data layers a local authority holds, for consideration in strategic level planning (as part of the local plan evidence base), as well as in development control decisions, neighbourhood planning and City Region planning.

In terms of shared values, there may be scope to identify areas of particular CES value using the heat map approach, and/or by holding public workshops in order to gain consensus over the areas people find most important. These special areas could then carry more weight in decision-making (in which case the accuracy of pin locations should be confirmed), potentially through recognition in Supplementary Planning Documents. For example the Mayor of London produced planning guidance on managing London's strategically important views, referring to 'Protected Vistas', and 'sight lines to Strategically Important Landmarks' (Greater London Authority, 2007). Alternatively, a new 'locally listed view' designation could be created to influence decision-making regarding proposals for development or other land use change that would significantly affect a popular view. A recently published Green Paper calls for the Government to introduce a new designation of 'Areas of Outstanding Urban Beauty' to recognise visually appealing places, and a new class on the Community Asset register called 'local beauty assets' (Harvey & Julian, 2015).

As well as contributing to development-related decisions, CES data could be used by landowners and land managers (public, private and third sector) in order to target (limited) funding for landscape restoration to areas of mutual benefit for people and wildlife. One of the aims of this study's participatory workshops was to identify how the general public

perceive proposed changes to landscapes which are undertaken for ecological benefit. Those attending the workshops were generally supportive of the proposed changes to the landscape, including the planting of woodland on existing fell-land in Duddon Valley, so long as the planting is 'natural-looking' rather than plantation-style, not carried out on the very top of the fells (thus keeping their open and bleak appearance), and doesn't obscure views. Plieninger et al. (2015) suggested that awareness of CES in landscape planning can improve transboundary management of sites, whilst they also reported that up to 47% of woodland owners in England are driven by concerns for CES, i.e. a desire to manage their woods for public or private recreation, aesthetics, or wildlife watching. Cultural value information could therefore form part of the criteria looked at when assessing what landscape change activities to undertake, i.e. alongside other economic, social and environmental criteria, using multi-criteria decision analysis or other decision-making techniques.

## **Conclusion**

The PGIS tool has produced some fascinating findings, such as the correlation of pin locations with certain land cover types and environment datasets. This has led to recommendations on ways of integrating CES data into the GIS evidence base for land use and landscape planning, alongside traditional environment datasets. It should be noted that, as a pilot study, only a very small proportion of the inhabitants of the Morecambe Bay area were invited to take part, and thus the findings are neither statistically robust nor representative of the local population.

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