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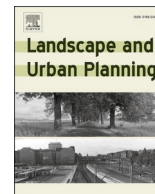
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journal homepage: [www.elsevier.com/locate/landurbplan](http://www.elsevier.com/locate/landurbplan)

## Impacts of woodland planting on nature-based recreational tourism in upland England – A case study

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### HIGHLIGHTS

- Nature-based recreation provide a substantial income to upland areas.
- Planting new woodlands would not negatively impact visitor numbers up until a 75% woodland cover scenario.
- There is a difference between visitor landscape preference and the probability of return visits.
- Local stakeholders should not be concerned about the impact of woodland planting on nature-based recreational tourism.

### ARTICLE INFO

#### Keywords:

Nature-based recreation  
Tourism  
Woodland  
Upland  
Cultural ecosystem services  
Economics

### ABSTRACT

Upland landscapes provide important ecosystem services (ES) to society. One cultural ES– nature-based recreational tourism (NBR) – is a growing industry in upland regions that provides an important revenue to areas where other industries are often in decline. NBR tourism is a service that relies partly on the aesthetic appearance of the landscape and changes in land management, such as increasing woodland cover, changes the appearance of the landscape and may therefore have a positive or negative impact on the economic value generated by NBR tourism. We tested this query, by carrying out a survey of NBR tourists, using photo visualisation of different woodland scenarios, in a pastoral upland landscape in a UK National Park. This was conducted to estimate the economic value of NBR tourism under different woodland scenarios and participant's preferences. The findings presented in this paper suggest that NBR tourism generates a substantial income to the area and that the economic value would not decrease, if woodland cover were to increase up to 75%. The findings also make an important observation on how there is a difference between peoples' preference for woodland levels and the probability of return visits.

### 1. Introduction

The English uplands have largely been defined as Less Favoured Areas (LFAs), which as DEFRA (2011) indicates, is the EU classification for socially and economically disadvantaged areas first established in 1975. LFAs are defined as land which is suitable for extensive livestock production but not, owing to the geography of the area, other agricultural production. Approximately 12 % of England is considered upland (DEFRA, 2011), and as Sandom et al. (2019:266) summarise, upland

areas provide an estimated 70 % of the country's drinking water, 53 % (by area) of Sites of Special Scientific Interest and 25 % of woodland. Upland National Parks in England receive around 70 million visits annually. They are also key areas for agricultural production (containing 29 % of its beef cows and 44 % of its breeding sheep, *ibid.*). The uplands therefore support farming and forestry, act as reserves for biodiversity and natural beauty and provide important ecosystem services to society (DEFRA, 2020). Just over 2 million people lived in the uplands (using LFA data), which is close to 4 % of the population in England (DEFRA,

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<https://doi.org/10.1016/j.landurbplan.2022.104587>

Received 24 February 2022; Received in revised form 21 July 2022; Accepted 22 September 2022

Available online 21 October 2022

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2011). This makes upland areas politically complicated places with many opportunities for conflict (Avery, 2015) due to the challenges of multifaceted interests and trade-offs between competing land uses (Fitzgerald et al., 2021). The uplands face an uncertain future due to increasing and accelerated processes of agricultural decline, changes in policy towards 'public goods for public money' and the withdrawal of the EU Common Agricultural Policy (DEFRA, 2020). More than ever, agricultural landscape scale systems are encouraged to consider mixed and agroecological farming approaches, whereby considerations are made towards climate, biodiversity and agricultural production. Such land management can either be carried out by setting aside land and allowing natural and ecological processes to restore or more proactively changing or planting vegetation, such as trees. But the impacts of such landscape changes are not just ecological, but may also show effects more broadly, for example livelihoods and local communities, economy and tourism (Rotherham, 2007). This presents a fundamental challenge for upland policy makers – how to deliver landscapes that provide conservation value, agricultural production and tourism/recreation activities.

### 1.1. Nature-based recreation

Tourism is of high economic importance to the uplands of the UK (Cumbria Tourism, 2019). In other areas of Europe, where agriculture has declined, tourism has become the principal income generator (Butler et al., 1998; Garrod et al., 2005; Kneafsey, 2000). Rural tourism development can additionally result in improved socio-economic well-being, leading to higher employment growth rates, as well as earning higher incomes (Reeder & Brown, 2005; Cumbria Tourism, 2019; Streifeneder & Dax, 2020).

Nature-based recreation (NBR) is especially important to the tourism sector in UK upland areas (Cumbria Tourism, 2019). This specific form of tourism can be defined as the activities people may leisurely engage with in natural areas, and includes hill walking, fishing, cycling, running, wildlife viewing and horse riding (Fredman & Tyrväinen, 2010). There is good evidence that participating in NBR can have a positive impact – both directly and indirectly – on the health and well-being of people (Brown & Bell, 2007; Sherman et al., 2005; Li et al., 2011; Mapes, 2012; Ward & Aspinall, 2011). NBR locations can also be perceived as a refuge from urban life as a place to heal (Cloke, 2003; Stenbacka, 2001) or by those seeking a perceived rural idyll (Daugstad, 1999; Christou et al., 2018). In the predominantly upland English county of Cumbria, NBR accounts for 68 % of visitors and the tourism sector as a whole, contributed £3.13 billion to the local economy (Cumbria Tourism, 2019).

The activities of NBR are provided partly as an ecosystem service of the landscape. NBR tourists are more likely to visit areas which are aesthetically pleasing and will provide the right platform for the recreational activity chosen. Several studies have investigated public and tourist preference for landscape appearance, both internationally (Willis & Garrod, 1993; Soliva & Hunziker, 2009; Lupp et al., 2012) and nationally (Reed et al., 2009; Hall, 2014). Where landscape changes are proposed, findings generally suggest that visitors have a liking for the status quo. There is, however, an evidence gap in investigating if preference for certain landscape appearance would lead to an actual change in visitor patterns, should the landscape change.

NBR provides an often much-needed boost to regional economies, and therefore concerns are sometimes raised when changes in land-management, such as woodland planting, will alter the appearance of the landscape (Iversen et al., 2022). This is due to concerns of such changes negatively impacting local communities and the topic surrounding uplands and woodland often ignites a debate regarding the concept of rewilding (Carver & Convery, 2021) and further issues such as culture, conservation, agriculture and economy (Rotherham, 2007). Rotherham (2007) discussed NBR as an economic driver in future UK upland areas and questioned the value of changing upland landscapes

away from the cultural farmed landscape. On a regional scale, stakeholders have argued that increasing woodland cover on the upland areas of Cumbria will have a detrimental impact on visitor numbers (Iversen, 2019), but no formal or evidence-led investigations have been made locally to assess if this is the case. In fact, according to both Chan et al., 2012 and Burton's et al. (2005) review of the evidence base of the effects of woodland expansion on ecosystem services in upland UK, there is generally a significant lack of focus on cultural and recreational services.

### 1.2. Assessing the economic value of nature-based recreation

The question of whether or not changing land management or land use would actually decrease tourism numbers to an upland area, is an important question when considering NBR and what it provides in terms of economic income to local rural areas. Generally, it is a common problem and challenging to measure cultural ecosystem services (Daniel et al., 2012; Kenter et al., 2015). Even measuring more quantifiable ecosystem services site-specifically, is difficult and often carried out via modelling approaches (Zank et al., 2016). Given that a cultural service is likely to be heavily influenced by locality (Convery & O'Brien, 2012), site-specific assessments are vital, if they are to be meaningful. The ecosystem service toolkit TESSA (Toolkit for Ecosystem Service Site-based Assessment) offers guidance on economic estimation of the impacts on NBR when changing from on land use or management to another (Bradbury et al., 2021) by using in-site data collection via surveys (Soe Zin et al., 2019; Jones et al., 2020), and often accompanied by use of graphical medias (Hegetschweiler et al., 2017).

Where there is a need to survey the views of a specific target participant (people that are visiting the area in question for NBR purposes), non-probability convenience intercepts sampling has shown to be beneficial. (Chhetri et al., 2004; den Breejen 2007; Newing, 2011; Kim & Weiler, 2013). A common and recommended approach in studies, where perceptions of a changing landscape are explored (Chhetri et al., 2004; den Breejen, 2007; Soliva & Hunziker, 2009; Kim & Weiler, 2013), is to carry out the sampling in-situ and combined with a visual aid of the landscape changes. This allows the participants to get a sense for a more detailed experience and sense of being within or immersed in the landscape under the different scenarios (Lefebvre, 1991; Lange, 2001; Orland et al., 2001; Soliva & Hunziker, 2009). Some visual aids used in previous studies include basic maps (Primdahl, 1990), drawings or charts (Palang et al., 2000; Tress & Tress, 2003) or more sophisticated GIS-based modelled landscapes (Hegetschweiler et al., 2017). Using a photograph for visualisation allows for a more realistic visualisation of how the proposed woodland scenarios would aesthetically impact the area from afar (Tress & Tress, 2003) but can also have inverse effects (McCloud, 1993; Rose, 2014). Therefore, As Karjalainen and Tyrväinen (2002) recommends, using visual mixed techniques is most appropriate if it incorporates an on-site visit.

This study aims to; a) estimate the economic value of NBR tourism under different woodland level scenarios, b) if NBR visitor patterns would change, if woodland cover were to increase and a) NBR tourist preference for woodland levels. Finally, the study questions if NBR tourist preference for woodland levels necessarily links to their probability for return visits. This research is carried out by the use of surveys and photograph visualisation.

## 2. Methods

### 2.1. Study area

The UK contains 15 National Parks (IUCN category V) and eleven of these are in upland areas (IUCN, 2021). They have, both historically and increasingly, been landscapes sustaining important nature-based recreation activities, especially for walking and aesthetically pleasing scenery, and all have their own defining characteristic. Within England, characteristic landscapes are further defined by National Character



# Howgill Fells Natural Character Area

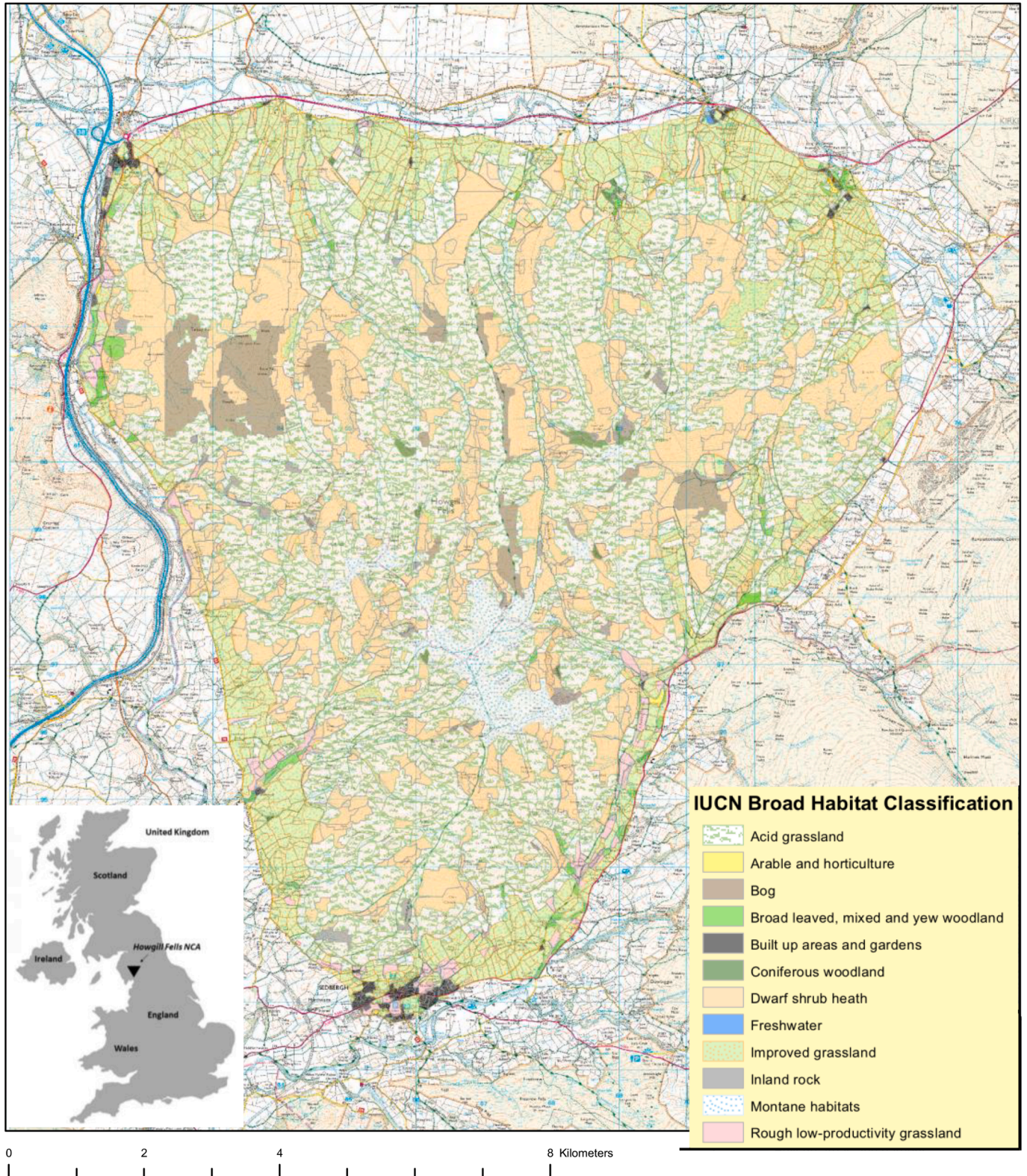


Fig. 1. Study area the Howgill Fells Natural Character Area with broad habitat classification indicators and location within the UK.



Areas (NCA). The NCA of the Howgill Fells covers an area of 10,360 ha and is situated in Cumbria, in the north-west of England (Fig. 1) and lies within the boundaries of the Yorkshire Dales National Park. The area is very representative of the upland regions of Cumbria by being rural, isolated, strongly influenced by hill farming and having a strong cultural identity and similar socio-demographics (Natural England, 2014). Seventy-seven percent of the area is common land, which is collectively used by a number of people who all hold traditional and statutory rights to graze their livestock. Woodland cover within the NCA is, at 1.5 %, one of the lowest levels found in any NCAs in England and the lowest in Cumbria (Natural England, 2014). Large amounts of tree planting have been carried out within the study area, as part of agri-environment schemes, which have raised regional concerns about the changes potentially causing a negative impact on nature-based recreational tourism visitor numbers (Iversen 2019). Tourism is important to the area, with annual visitor numbers of approximately 460,000 a year and sixty-eight percent of these visiting for NBR (Cumbria Tourism, 2015). A visitor survey by Cumbria Tourism (2015) showed that 96 % of visitors felt that the NCA 'is a good place for outdoor activities'. The top three key reasons for visiting were: 'because of the physical scenery and landscape' (61 %), 'because of the atmospheric characteristics of the area – peaceful, relaxing, beautiful etc.' (40 %) and 'been before' (37 %), followed by 'undertaking a specific activity' (19 %).

This combination of currently having a low woodland area and high NBR visitor numbers make the Howgills NCA an excellent focal area to investigate visitor perceptions of woodland cover. Using an NCA boundary line and area as a case for the study was also deemed to be useful as it ties in with existing landscape-scale policy guidelines. Any outcomes from the study would therefore be more meaningful and useful for informing decision making. The NCA profiles are working documents and can be adapted according to new information available (Natural England, 2010). Furthermore, the NCA profiles consider the area and landscape in a rounded view, focussing not only on one or two factors, such as climate change and economics, but everything it perceives as being important in understanding the natural characteristics of an area. Woodland creation in upland Cumbria is linked in with the NCAs. Before any woodland planting is considered on a landscape scale, National environmental and forestry departments would seek guidance from the area-relevant NCA profile and assess whether new planting would be suitable for this particular area. In addition, the Howgills NCA have an identified objective of increasing woodland and a large amount of tree planting is either being considered or has already taken place. Due to unknown future woodland expansion levels within the NCA, scenarios of different levels of woodland (10 %, 25 %, 50 %, 75 % and 100 %) were used for the survey.

## 2.2. Data collection

The impacts of woodland creation on NBR were surveyed in the Howgill Fells NCA from the 1st of June 2016 to the 1st of September 2016. The survey followed the guidelines by the TESSA Toolkit (Peh et al., 2013) and combined an in-situ intercept convenience survey (Newing, 2011) with a photo visualisation approach (Kim & Weiler, 2013). NBC visitors were invited to participate in a survey and a total of 493 questionnaires were collected.

Participant sample size was determined based on data provided by Cumbria Tourism (2015), and Sedbergh Tourist Information Centre (STIC), who provided tourism data (Wood, Personal Communication, 2016) based on visitors to the STIC, suggesting that around 317,160 people visit each year. STIC has an automated people counter at the door, which gives a very accurate estimation of visitor numbers to the STIC. On the assumption that each visitor to the STIC creates two counts (enter/leave) the counts were halved to obtain realistic visitor numbers. Furthermore, it was estimated by STIC staff that each staff member accounts for six counts a day and, on average, four ticks a day account for locals or deliveries to the shop. With these subtractions, the visitor number was established. By setting the confidence level at 95 % and

confidence interval at 5, a questionnaire sample size was determined to be of a minimum of 384 participants to be statistically robust (Newing, 2011).

Data were collected during the hours of 08:00–17:00 including weekdays, weekends and days within and outside school term time. The timings during the day were designed to be able to intercept visitors as they began or finished their walks on the hills but were also varied to try and intercept a variation of visiting participants. On average, 15 questionnaires were completed a day over 32 days in the field. The researchers positioned themselves at strategic points on streets, paths on the fells, cafés, caravan/campsites and at the tourist information centre – all within the study area. Contact with participants was made to people passing with one of the opening questions along the line of, "Are you visiting or a local resident?", to establish whether they were indeed a tourist or visitor and eligible to participate in the survey. All visitors were asked to participate, with no stratification of age or gender. Furthermore, participants were asked about their primary reason for visiting to ensure they fit the participant profile (visitors for nature-based recreational purposes). Local residents were excluded from the survey. The five pre-designed scenarios of different levels of woodland in a single photographic view, were presented via the survey to participants and always within the physical site of the landscape in question. Answers were then recorded by the surveyors on paper.

## 2.3. Questionnaire design

The questionnaire designed for the survey followed recommendations by Dillman et al. (2014), i.e., a formal standardised questionnaire – Appendix I. A pilot survey on-site and with participants within the targeted socio-demographics were carried out, which highlighted a need for adjustments to the questionnaire in regard to the design of scenario choice, as participants found this section to be confusing and vague. A final edited version of the questionnaire was successfully trialled afterwards. Four sections were included: 1) socio-demographics, 2) reasons for visiting, 3) scenario and woodland preference and 4) expenditure during the visit. The first section established the socio-demographics of participants; age, gender, postcode of residence, mode of transport and visiting pattern. The second section assessed the participants' primary reason for visiting. This section has five options: i) appreciating/viewing nature/landscape, ii) exercise, sports or hobbies, iii) visiting towns/shopping, iv) time with friends or family and finally v) 'other', where any reason not falling into any of the above categories could be entered. This section was designed to establish the primary reason for the participants' visiting the area. The third section asked the participants to consider each of the woodland scenarios of 10 %, 25 %, 50 %, 75 % and 100 % woodland cover (accompanied by the digitally altered photographs of the Howgill Fells NCA) and whether they would be 'more likely to visit again', whether the woodland would 'make no difference to visiting again' or be 'less likely to visit again' under each scenario. In addition to being asked the above questions regarding a change in visiting pattern, they were also asked if they had a preference for any of the scenarios and for a certain broad woodland type (mixed, broadleaved, coniferous) or broad woodland purpose (productive, nature/recreational).

## 2.4. Photograph visualisation

The design of the manipulated photographs showing the five different woodland scenarios was created by using a landscape photograph of the Howgill Fells NCA obtained from the free online open-source photograph library Gallery3. Care was taken to utilize a photograph which was as realistic as possible in depicting the characteristics of the NCA. The photograph editing software PaintShop Pro X9 Ultimate was used to manually edit the photographs and add an increasing level of woodland to each of the pre-designed scenarios – Fig. 2. The woodland already present within the original photograph was used as an added woodland resembling the proposed woodland in type and design



**Fig. 2.** The displayed photos show the manipulated photos of the Howgills Fells with different woodland cover scenarios used for the photo-visualization. Alt text: A row of 6 color-photographs showing a mountain range landscape with fields and sheep grazing in the foreground. Each photo has had some woodland added to it in increasing amounts, depending on the level of scenario.





Fig. 2. (continued).

as much as possible – i.e. a native woodland with a mixed type of tree species, spatially located on the lower levels of the fells, gradually increasing upwards, not increasing and covering the highest peaks. The area size to be increased under each scenario on the photograph was

determined by calculating the total geometrical area size of the parts of the photograph to be edited and then applying the woodland scenario percentage accordingly.

2.5. Estimation of economic value of nature-based recreation in the Howgill Fells NCA

Estimation of the current economic value of nature-based recreation in the Howgill Fells NCA and after the proposed woodland scenarios was carried out using a monetary figure of visitors per person per trip expenditure, derived from the regional tourist board data (Cumbria Tourism, 2015) and following TESSA guidelines (Peh et al., 2013). This figure amounts to £167 per person per trip, which was then multiplied by the visitor number of 317,160, derived from the tourist board and local tourist information centre, and totals £52,965,803. This figure was applied as the current value of NBR tourism in the Howgill Fells NCA. Determining the value of the alternative scenarios was then calculated with the same approach but using the adjusted visitor numbers according to their probability of return visits obtained from the survey. A conservative assumption was made that a ‘more likely to visit again’ choice under any scenarios would entail one extra visit per year, with the added value of an extra £167. Therefore, each participant choosing the ‘more likely to visit again’ category, would be given the value of £334. Participants choosing the category of ‘make no difference to visiting again’, applied the value of £167 (one visit/year). For participants choosing the category of ‘less likely to visit again’, the value of £0 was applied. These figures were then used, in combination with the survey data, to calculate the economic value of nature-based recreation under each of the woodland scenarios (Iversen, 2019). A Chi-squared analysis was carried out to estimate levels of significance between categories.

3. Results

A total of 493 questionnaires were collected from visitors to the Howgill Fells NCA. From these, 426 questionnaires were from visitors that stated that they were primarily visiting for nature-based

recreational reasons, by choosing either or both categories of: a) ‘Appreciating/viewing/landscape’ or b) ‘Exercise/sports/hobbies’. Anyone primarily visiting for the reason of: c) ‘Visiting town’, d) ‘Visiting family or friends’ or e) ‘Other’ and not choosing any of the reasons in category a or b, were disregarded in the analysis. A Chi-squared analysis of difference showed that there is a significant association between the amount of woodland cover and the pattern of visitation probability (chi-squared value 171, d.f, n = 8, alpha = 0.05/p = 15.5). In particular, for the lowest levels of woodland cover (10 %, 25 %) fewer people than expected (assuming no impact of woodland cover) would not visit again, and levels of cover at 75 % and 100 % are associated with a lot more people than expected choosing not to visit again”.

3.1. No difference to visiting again

Although the majority of participants in every scenario felt that changing amounts of woodland would not influence their likelihood of return visits, there was a clear decline in the proportion of ‘uninfluenced’ participants as the amount of woodland shown increased, from 74 % of participants in the 10 % woodland scenario to only 56 % of participants in the 100 % woodland scenario (Fig. 3). This suggests that woodland cover does have an impact on likelihood of visiting again.

3.2. Less likely to visit again

As woodland cover increased, so did the proportion of visitors that felt they would be unlikely to visit again, from 3 % at 10 % cover to 28 % at the 100 % cover. There are particularly pronounced increases in the number unlikely to visit in the 75 % and 100 % scenarios.

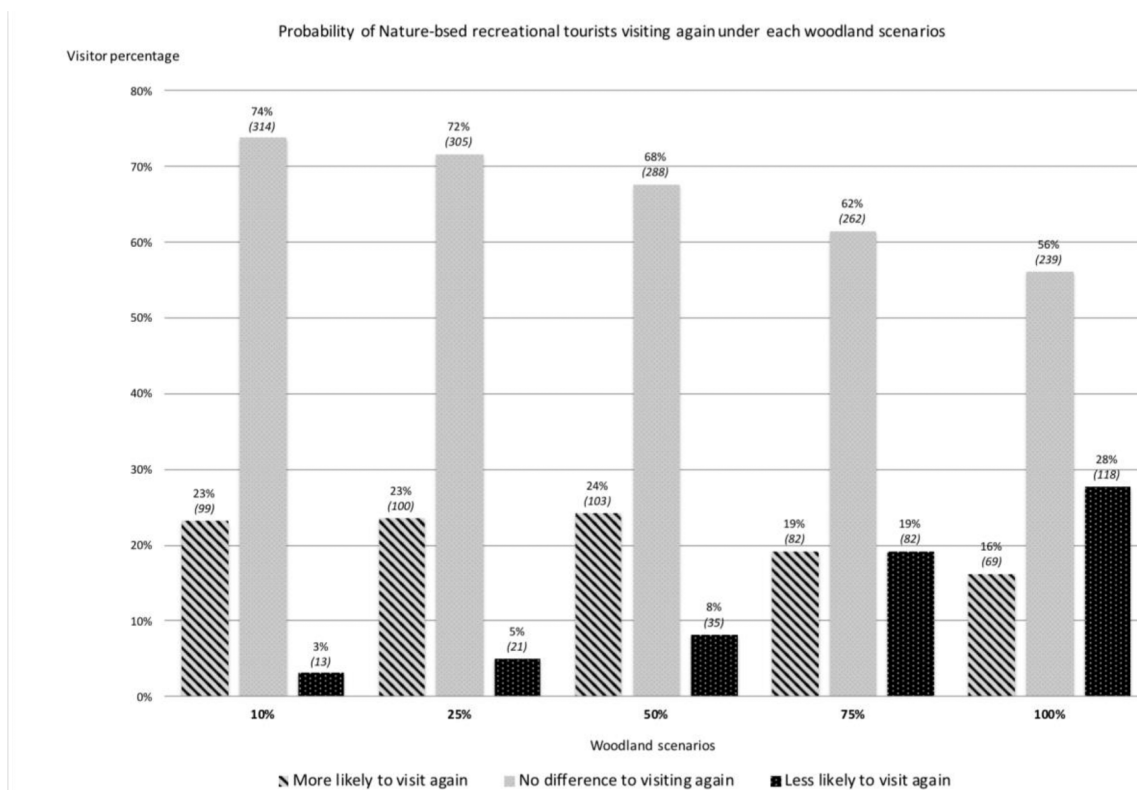


Fig. 3. Percentage of visitors and number of participants (brackets, italics) under each of the woodland scenarios and probability choice for return visits. Alt text: A bar graph showing the percentage of visitors and number of participants (brackets, italics) under each of the woodland scenarios and probability choice for return visits. The percentage of ‘no difference’ participants are decreasing as scenarios increase. The percentage of ‘less likely’ participants are increasing as scenarios increase. The percentage of ‘more likely’ are steady in the first 3 scenarios (10%, 25%, 50%), but slightly decrease in the last two scenarios (75% and 100%).



**Table 1**

Monetary value derived from Cumbria Tourism data using the £167 and a per person per visit value.

Woodland scenario	Value £ derived from per person per night spent	Change from current state	Percentage change from current state
Current	£52,965,800		
10%	£63,558,860	+ £10,593,060	+ 20%
25%	£62,499,580	+ £9,533,780	+ 18%
50%	£61,440,130	+ £8,474,330	+ 16%
75%	£52,965,550	- £250	- 0%
100%	£46,610,030	- £6,355,770	- 12%

**3.3. More likely to visit again**

The number of visitors more likely to visit again remains much higher (23–24 %) than those not likely to return (3–8 %) in all scenarios with less than 75 % woodland cover. This suggests that significant increases in woodland cover, up to 50 % cover, would result in a net increase in visitors to the area.

**3.4. Economic assessment**

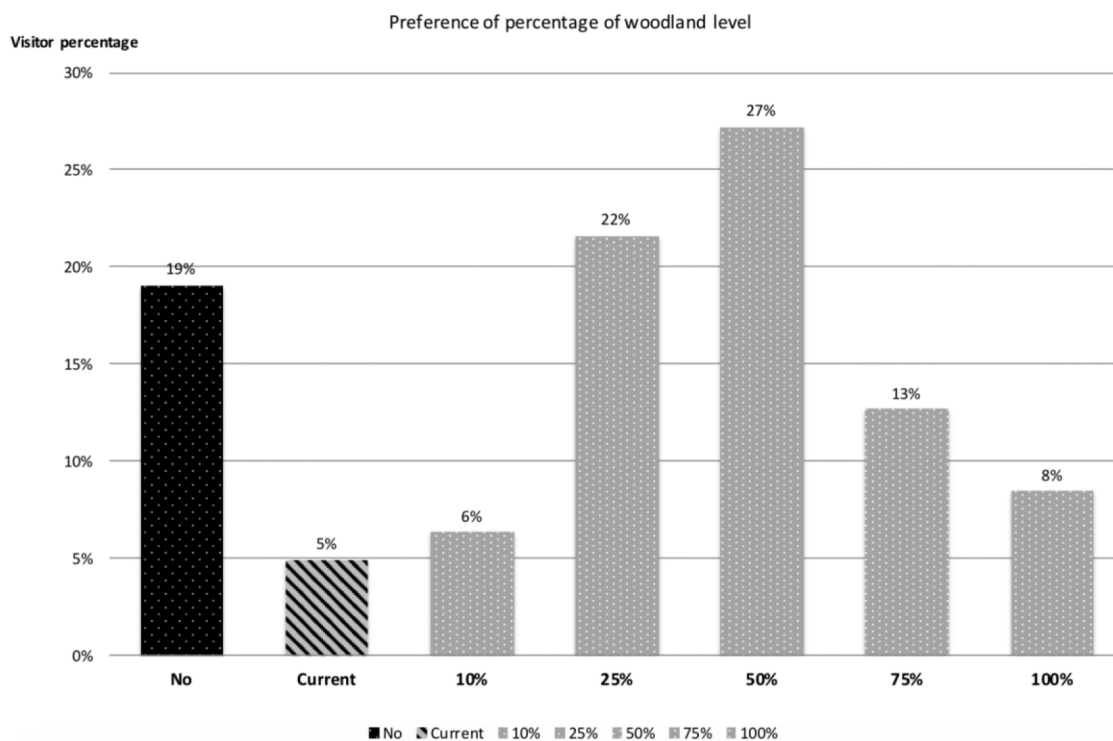
The results from this study shows that an increase in woodland levels could economically benefit revenue derived from nature-based recreation in the Howgill Fells NCA. The economic value increases with approximately 16–20 % each under the lower woodland scenarios of 10 %, 25 % and 50 %. The highest revenue to be expected is under the 10 % scenario. However, the increase in economic benefit peaks by the 50 % scenario and the difference in monetary value between the current state and 75 % woodland scenario is minimal by £250 (0 %). However, by the 100 % woodland scenario, a significant decrease in value is expected to be lost with a decrease of 12 % (or £6,355,896 per annum on 2015 rates) – Table 1.

**3.5. Visitor preference for woodland scenario and woodland type**

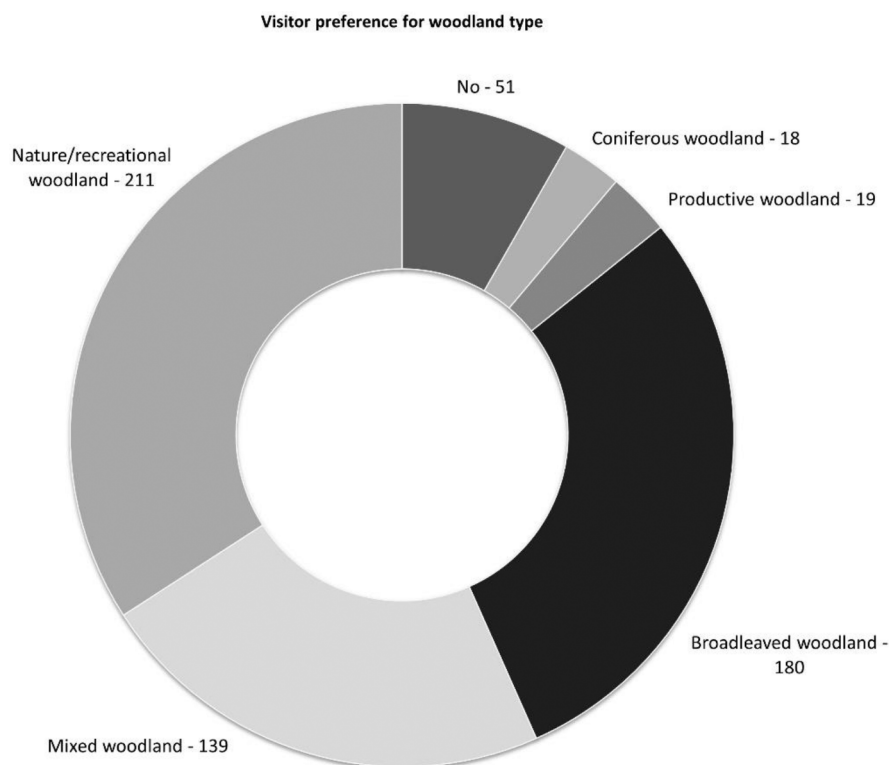
When asked which level of woodland cover they preferred, most people preferred the 50 % scenario (27 % selected this) and 25 % scenario (22 % preferred), although 19 % of participants had no preference – Fig. 4 The least-preferred woodland scenarios were the current cover of 1.5 % (only 5 % preferred) and the 10 % cover scenario (6 % preferred). The two highest cover scenarios, which indications on the likelihood of revisiting showed were least favourable, were preferred by 13 % (75 % scenario) and 8 % (100 % scenario) of participants. Additionally, preference for woodland type was also a variable of data collected and showed a preference for woodland types of broadleaved and mixed species, with an emphasis on nature and recreational purposes (Fig. 5).

**4. Discussion**

This study has shown that NBR visitors to the Howgill Fells NCA currently provide substantial economic value to the area. Our research suggests that increasing woodland areas within the study area, could, up to a point of 75 % coverage, be beneficial to the local economy. The results from the economic assessment and participants’ preference



**Fig. 4.** Visitors’ preference for percentage of woodland cover under each of the woodland scenarios, as well as the percentage with no preference at all. Nineteen percent of visitor has no preferences at all, whereas most visitors have a preference for 25% scenario – 22% – and 50% scenario – 27%. Only 5% prefers the current level of woodland cover.



**Fig. 5.** Visitors' preference for woodland type (mixed, broadleaved woodland and coniferous woodland) and purpose (productive or nature/recreational). Alt text: A donut graph showing visitors' preference for woodland type (mixed, broadleaved woodland and coniferous woodland) and purpose (productive or nature/recreational). The majority ( $n = 180$ ) preferred broadleaved woodlands or mixed woodland ( $n = 139$ ) with a nature/recreational purpose ( $n = 211$ ). Only few ( $n = 18$ ) preferred coniferous woodlands with a productive purpose ( $n = 19$ ). Some had no preference ( $n = 51$ ).

regarding woodland levels, indicate that the majority of NBR visitors are supportive of the idea of increasing woodland within the study area.

Hall (2014) surveyed the neighbouring and similar upland landscape of the Lake District National Park, and found that 51 % of the public preferred the status quo, i.e. not changing the landscape. Several studies (Willis & Garrod, 1993; Soliva & Hunziker, 2009; Reed et al., 2009) have found similar results to Hall (2014) and combined with our results, therefore adds to the knowledge base of public perception and preferences in landscapes. Hall's (2014) study does differ to ours, as their participant group consisted of both residents and visitors. Our study focused specifically on surveying visitors that come to the study area for NBR purposes, as this group is suggested to mainly contribute to the tourist revenue in this specific area according to Cumbria Tourism data. This makes the difference between results from our and their results particularly interesting, as they focus on the same geographical area and investigate landscape preferences, but from two different participant groups. This exemplifies the need for specific participant focus.

If local planning authorities and tourist boards are concerned about loss of tourism revenue caused by changes in land-management in the landscape as shown in Iversen (2019), then it is important to address such concerns by using data obtained from the visitors in question and not a large broad data set, which includes the general public, residents or even tourists visiting for alternative reasons than NBR. We acknowledge that our study provides insight into current visitors' opinion on this topic and not potential new visitors who may be attracted to the Howgill Fell NCA, should woodland increase in the landscape. Or vice versa. It is recommended that further studies into this subject would increase our knowledge of this aspect of human behaviour and perspectives. The method presented here can equally be applied to other areas using data specifically relevant to the socio-demographic and locality in question.

The results highlight that for the majority (Fig. 3) of participants under all woodland levels scenarios, changes in woodland levels would make no difference to the probability of them visiting again. Which would suggest that the landscape is not the only motivation behind their visits and more research is needed into untangling this connection. It may be that the platform the landscape provides to carry out NBR

activities is equally as important as the aesthetics. Within the category of being 'less likely to visit again', our results similarly show that at the lower scenarios, there are very few visitors who would have their return visits influenced by a change in woodland levels. This does, however, steadily increase and a much higher percentage of visitors indicate that the higher woodland scenarios would negatively influence the probability of return visits. Many participants commented that it was simply 'too much' and would spoil the aesthetic appeal of the fells. A similar trend is observed in participants who stated that they were more likely to visit again under the alternative scenarios and were positively inclined towards the middle levels of woodland cover. Similarly, where respondents were indifferent to tree cover levels, those who were generally supportive of an increase in woodland cover did often express a concern for the tops of the fells being covered in trees and, as a result, the views being spoiled. Having the skyline and the tops of the fells clear seems to be important to visitors. This spatial configuration of planting would benefit from more in-depth exploration in future studies.

This research has focused on the specific view of current NBR visitors to the area to address concerns over the impact of tree planting on extant tourism. Whilst we have focused here on the total amount of tree cover, the composition is also important. Section 3 of the questionnaire provided supplementary data on preference for woodland type and purpose. It was clear from these responses and from conversations with visitors, that there were strong feelings connected to which type of woodland that was planting and for what purposes. A complementary study which investigated stakeholder perspectives and emotions on planting new woodlands within the study region also found that there is much disagreement and conflict between different stakeholder groups in the area and that conflict often arises regarding woodland type and purpose Iversen et al. (2022). How the landscape looks and is used is an important topic to both visitors and local stakeholders.

The use of photograph visualisation as part of this assessment helped participants envisage the proposed alternative scenarios. During this study, the manipulated scenario photographs were used as an aid to the survey when participants were struggling to visualise how a scenario might appear. This mixed method approach was partly informed by



Soliva and Hunziker (2009), who observed, in their research using photograph visualisation on a changing landscape, that local residents in particular had problems visualising landscape changes and scenarios. This may be due to the argument, raised by many, that landscapes are perceived and appreciated not just for their aesthetic appearance, but how they make us feel – or rather – the ‘sense of the place’ (Leader-Elliott, 2012; Mansfield, 2012). We experienced the same issue especially during conversations with local residents, however our study participants did not have a personal connection to the place, and it was easier for them to focus on the visual dimensions and not be influenced by cultural or place-specific factors. This strengthens the validity of using photograph visualisation as a method for our survey. Another consideration towards a potential persuasive nature of the approach is that it, as suggested by Sheppard (2005), deliberately engages emotions with the photographs. In this study, many participants found it more useful to simply look at the surrounding hills and, aided by the scenario photographs, imagine the tree line and type of woodland. The edited photographs were of a simplistic nature and if a more sophisticated photograph manipulation software, such as augmented reality (Portman et al., 2015), had been employed perhaps the photograph visualisation would have had more strength as a standalone method. Acknowledgement should be made and considered towards the discussed limitations of using photo visualisation in the interpretation of the results.

Our study also followed the TESSA site-specific assessment protocol, to estimate the economic values of NBR. Using a survey with a convenience intercept sampling approach was beneficial for this, as it allowed us to focus on NBR participants who were visiting the Howgill Fells NCA specifically. However, the average age of these participants was 45 years old. Very few families or young people took part. Some older teenagers accompanying their parents were observed, which has contributed to lowering the average age. The Cumbria Tourism data (2015) supports the age profile of our study and shows that 65 % of visitors to the area are within this age-bracket.

By using site-specific data obtained from the local tourist centre and combining it with Cumbria Tourism data, we were able to make an economic assessment that is meaningful to the local area directly, but it does have its limitations and we acknowledge that our study provides a simplistic view on a complex topic. Firstly, the calculations carried out used a value of £167 per person per trip, which were informed by Cumbria Tourism data. This is under the assumption of only 1 visit per year by that person. The information derived from the data collection suggested that most visitors visit the Howgill Fells NCA 1–2 times a year (45 %), but that 18 % visit 3–5 times a year and 15 % >5 times a year. Additionally, 23 % indicated that they had visited in the past, but not on a regular yearly visiting pattern. Therefore, the derived value can be observed as being very conservative. The reason behind using the value as it stands is that it was unclear from the information collected on return visits as to whether the visits are day visits and/or including accommodation. Therefore, the data from Cumbria Tourism (2015) was deemed more accurate, but nonetheless a conservative estimate. In addition, giving an exact economic estimate on how changes in the landscape will impact a local area is very difficult, due to the complexity surrounding international markets and trade.

Our research has provided an insight into how planting new woodland within the Howgill Fells NCA could impact NBR tourist patterns, and, indicates that there is a threshold by the 75 % scenario. Further investigation into how such an amount of planting would influence other key parameters would be needed to understand wider impacts e.g. on biodiversity or climate change goals. The results can, however, be used as a guide to land management with consideration to national environmental policies and strategies. As an example, any woodland planting above the 75 % scenario would conflict with the Government’s 25 Year Environment Plan and the England Peat Action Plan in its focus to restore and protect peatlands. Below the 75 % scenario, planting on areas peatland in this location can be avoided. Similar consideration would have to be made for other environmental parameters. Due to the representative nature of the study area, the results here may be applied

to the Cumbrian uplands as a whole, but are less applicable to other areas of a distinctively different landscape character.

## 5. Conclusion

Overall, given the evidence presented in this paper, we put forward the argument that increasing woodland up to a certain level in the Howgill Fells NCA, would not have a detrimental impact on NBR tourism to the area. In fact, there could be a beneficial economic gain up to a level of 50 % woodland cover increase. At the 75 % woodland level no change in comparison to *status quo* would be expected, but should the upland landscape be completely covered by woodland, then this would have a negative impact. This paper has highlighted that there is a point at which additional planting will start to have a negative effect on returning visits. It is important to find the balance between the need for planting additional trees at a site and the need for visitors who contribute to the economy. As shown in previous studies (Hall, 2014) this tipping point can be different in other landscapes and different participant groups can have different levels of acceptance of tree planting. Our study also makes an important observation on how there is a difference between peoples’ preference for woodland levels and the likelihood of return visits.

Our study does not take cultural, environmental or ecological benefits or disadvantages of increasing woodland cover in the uplands of Cumbria into consideration and no doubt, this should be considered as well, when considering large-scale landscape changes, as shown in Iversen (2019). This study focuses only on the relationship between NBR tourism and landscape and, by doing so, aims to provide specific evidence and knowledge to this under-investigated area of landscape management. Therefore, and on a local scale, our results provide supplementary evidence to all involved stakeholders in management of the Cumbrian landscape, such as estate managers, NGO’s, farmers, environmental governing bodies, and can be used in future considerations regarding the overall implications of planting trees and woodlands within the NCA. On a broader scale, our study adds to the national and international knowledge base of the relationship between the upland landscape, woodlands and cultural ecosystem services and may inform further rural and landscape management and policy decision-making.

## 6. Funding source information

This work was supported by the Forestry Commission, UK (Grant number CFS 7/16) and the University of Cumbria, UK. The funders had no role in the study design, but in data collection and analysis, decision to publish, or preparation of the manuscript.

## 7. Data

The data that support the findings of this study are available from the corresponding author, [author initials], upon reasonable request.

## CRedit authorship contribution statement

**Sara V. Iversen:** Conceptualization, Methodology, Formal analysis, Investigation, Writing – original draft, Writing – review & editing, Visualization, Project administration. **Naomi van der Velden:** Writing – original draft, Writing – review & editing, Supervision. **Ian Convery:** Conceptualization, Methodology, Writing – review & editing, Supervision. **Lois Mansfield:** Supervision, Writing – review & editing. **Chris Kjeldsen:** Writing – review & editing. **Martin Hvarregaard Thorsøe:** Writing – review & editing. **Claire D.S. Holt:** Conceptualization, Writing – original draft, Writing – review & editing, Project administration, Supervision, Funding acquisition.

## Declaration of Competing Interest

The authors declare that they have no known competing financial

interests or personal relationships that could have appeared to influence the work reported in this paper.

**Acknowledgement**

None.

**Data availability**

Data will be made available on request.

**Appendix**

**Interview question for visitors to the Howgills NCA**

**Site:**

**Researcher:**

Interview date:

Time/location/weather:

Resident/visitor:

First part of postcode:

How many people in group:

Age/Gender:

**Mode of transport:** car/walk/bicycle/horse/public transport/Caravan/other

**Have you visited before and how often do you come?**

Yes          No          in the past          1-2 p/y          3-5 p/y          5+ p/y

**What is your primary reason for visiting?**

Appreciating/viewing nature/landscape

Exercise, sports or hobbies (running, walking, dog walking, biking, fishing etc.)

Visiting towns/shopping

Time with family or friends

Other \_\_\_\_\_

**Would (insert state) make you:**

	More likely to visit again	Make no difference to me visiting again	Less likely to visit again
<b>10%</b>			
<b>25%</b>			
<b>50%</b>			
<b>75%</b>			
<b>100%</b>			

**Do you have a preference for a certain percentage?** \_\_\_\_\_

**Do you have a preference for woodland of a certain type?**

No          Conifer          Broadleaved          Mixed          Productive          Nature/recreational

**Have you spent or planning to spent money during this visit?**          Yes          No

*NB. This include meals, drinks, transport, souvenirs, accommodation etc.*

If yes, how much? \_\_\_\_\_ per person / per group

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