Fun with Fungi in the Forest: Making Tourist Experiences More Sustainable with Quality Interpretation[*]

Karen Hughes & Gianna Moscardo^*

*University of Queensland, Australia, k.hughes2@uq.edu.au

^James Cook University, Australia, gianna.moscardo@jcu.edu.au

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Introduction

For many years tourism has been criticized for its negative impacts on the natural and built environment; impacts that range from pollution, litter and erosion to habitat destruction, wildlife disturbance and graffiti. Yet tourism has also been championed as a way to increase public awareness of environmental issues and enhance people's commitment to adopting sustainable practices both at tourist sites (Brown, Ham & Hughes, 2010) and in their daily lives (Ballantyne, Hughes, Lee, Packer & Sneddon, 2018; Ballantyne, Packer & Falk, 2011; Walker & Moscardo, 2014). While some attention has been paid to managing the negative environmental impacts of visitation, little attention has been given to using visitor experiences as a way to encourage greater sustainability beyond the site (Moscardo & Murphy, 2014; Walker & Moscardo, 2014).

This paper seeks to direct attention to this issue by describing the design of a more sustainable set of tourist experiences at Binna Burra Lodge in Australia. After reviewing the issues linked to sustainable tourist experiences and the relevant literature on sustainability communication it will explore a specific case study of Binna Burra Lodge in the world heritage protected rainforests of southeast Queensland in Australia. It will describe the steps involved in designing a set of tourist experiences based on communication about rainforest fungi and present some preliminary interpretive materials arising from these steps. The overall aim is to demonstrate the application of research findings for sustainability practice in tourism.

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[*] FULL PAPER

As the number of tourists increases worldwide, it is imperative the industry develops effective ways to manage and minimize the potential negative impacts of tourism. Simultaneously, there is an imperative to develop strategies that maximise the positive impacts tourism can generate for tourism destinations and host communities. Such positives can include, but are not limited to, beautification and protection of natural areas, regeneration of derelict areas, and conservation of heritage structures.

Sustainability of tourism attractions and destinations can be enhanced and assured through three main approaches. The first is to offer visitors a range of experiences from which to choose – this reaches wider (and sometimes new) audiences and offers opportunities to connect visitors with environments that they may not have otherwise encountered. The second is to design experiences, systems and facilities that encourage more responsible actions on the part of users. Known as nudging or choice architecture, this option involves designing the environment in a way that makes it either easier for users to engage in desirable behaviours, or more difficult to engage in negative options (Hanson, Skov & Skov, 2016). It can include physical environmental design such as hardening paths and using barriers to restrict visitor movement in environmentally sensitive areas, creating obstacles to slow down or prevent access to natural habitats, using low flow water outlets in accommodation establishments, and providing smaller plates for buffet style food in resorts and cruise ships. Choice architecture can also involve changes to processes and systems such as requiring guests to opt out of a towel reuse program rather than opt in to save water in hotels (Moscardo & Hughes, 2018). Limiting entry to certain areas and restricting participation in certain activities through shorter opening hours and higher fees is another form of choice architecture (Moscardo, 2017a). Taken together, these approaches can enhance management's control over visitors and encourage visitors to make choices that benefit rather than harm the natural environment.

The third approach to enhancing sustainability is to provide persuasive communication as part of the visitor experience. This approach, referred to as interpretation, is common in nature-based tourism and typically involves providing visitors with information, stories and activities that convey the importance of the site (Moscardo, 2017b). Interpretation can support environmental conservation on site by informing visitors' decisions about where they go and what they do, as well as by providing a positive experience that encourages visitors to want to protect the visited

environment (Moscardo, 2015). While traditionally focused on presenting information about topics directly relevant to the immediate site, interpretation can also be about issues beyond the boundaries of the tourist experience and/or destination (Moscardo & Murphy, 2014).

The use of all three tourism management strategies is becoming increasingly important. Tourists are visiting natural environments in greater numbers, increasing the potential for negative impacts. Additionally, tourist markets are becoming increasingly diverse, resulting in visitor cohorts who may have limited experience of these natural environments. Designing tourist experiences and activities that engage these diverse markets is critical for both managing negative environmental impacts and inspiring visitors to become more environmentally active citizens (Ballantyne, Hughes, Lee, Packer & Sneddon, 2018).

Moscardo and Hughes (2018) argue that one of the key challenges in getting tourists engaged in environmental initiatives is that that organisations find it difficult to communicate the benefits of sustainability to guests, either because no one department is responsible or because it is assumed that guests won't be interested in learning about or engaging in sustainable practices. To counter this, Moscardo and Hughes (2018) provide guidelines and recommendations relating to the design of sustainability programs, and state that consistent messaging, support and reinforcement is the key to success. The available evidence from persuasive communication in general, and sustainability education in particular, highlights the need for tourism organisations to develop sustainability programs that can be easily and directly linked to some feature of their operations, most usually their location (Blose, Mack & Pitts, 2015; de Jong & van der Meer, 2015; Elving, 2013). For example, a resort operating in or near a coral reef is more likely to engender guest support for coral reef or marine wildlife conservation activities than for a program focused on artic water quality.

There is also evidence that persuasive communications must directly address barriers to engaging in a desired activity. While much of the existing tourism and sustainability literature that discusses on persuasive communication concentrates on attitude change and or social norms, wider research suggests that it is the perceived barriers that need to be addressed (Moscardo, 2019). For example, an urban hotel might want its guest to use public transport in order to limit their carbon footprint. Making visitors aware of and supportive of the need to change their use of private vehicles is not

likely to change their actual behavior if they believe that the local public transport system is too complex, inefficient or dangerous for them to use.

In addition to having a direct link between the tourist experience and the desired sustainability action and addressing tourists' perceived barriers, it is also necessary to provide support and reinforcement beyond the immediate tourist experiences. Studies in wildlife tourism contexts report that post-visit support enhances uptake of environmental actions. Post-visit support that has been shown to promote long-term behaviour change includes websites (Ballantyne, Packer, Hughes & Gill, 2018), prompt sheets and conservation information delivered via Facebook (Hofman & Hughes, 2018), email reminders (Hughes, 2011), and printed conservation kits that include fact sheets and family activities (Hughes, 2011).

Moscardo and Hughes (2018) also argue for the use of stories in persuasive communication reflecting substantial evidence from psychology, education and marketing that people are more likely to remember information presented in, or linked to, a story. Psychologists have long recognised that human brains are organized around stories with evidence that we pay more attention to stories, organize new information into story-like structures in order to comprehend it, and store information as stories (Goldstein, 2015; Gottschall, 2012; Popova, 2015). Research in educational and cognitive psychology consistently concludes that many of the conventions used in the textbooks for information presentation actually interfere with, rather than assist, comprehension (Goldstein, 2015; Matlin, 2013; Reed, 2013). Many of these textbook conventions have been adopted by interpreters, so it is not surprising to find that critical reviews of interpretation evaluation research conclude that there is little evidence that interpretation changes tourists' knowledge, attitudes or behaviours (Moscardo, 2014).

The power of both stories and post-visit communication to support attitude and behaviour change is reinforced in academic discussions of the role of new technologies, especially mobile technologies combined with social media platforms (Staiff, 2016). In this area encouraging visitors to interact with other and a larger collective beyond the site offers opportunities to share sustainability messages and provide collective support for engaging in responsible actions (Spears & Postmes, 2015; Velasquez & LaRose, 2015). As Pearson, Dorrian, and Litchfield (2011) note, the internet and social media offer easy potentially cost-effective methods of influencing the environmental knowledge, attitudes and actions of people globally.

Aim of the paper

The preceding discussion indicates that visitor experiences can be central to enhancing the sustainability of tourism both through the actual design of the experiences and through interpretation provided within these experiences. Further research into the effectiveness of interpretation highlights the importance of telling stories, having a direct and consistent link between the experience and the desired sustainability action, and providing post-visit support, especially through social media. The aim of the current paper, therefore, is to demonstrate how these strategies can be used to improve visitors' on-site and post-visit environmental sustainability. Using a case study approach, the paper describes the development of an interpretive concept plan focused on using fungi as a way to build a new experience at Binna Burra Lodge in Australia's Lamington National Park. The goal is to enhance existing rainforest trail experiences and support the lodge's take home sustainability messages.

Binna Burra Lodge, Lamington National Park

Binna Burra Mountain Lodge was founded in 1933 by two conservationists who wanted to share the beauty of the rainforest with visitors. They believed that providing interpretive walks and educational programs would help persuade guests about the importance of protecting the rainforest for future generations. Since its inception, Binna Burra has proved popular with bushwalkers, but also offers activities such as abseiling, orienteering, archery and yoga. The lodge offers accommodation options ranging from simple log cabins to three bedroom luxury apartments.

Binna Burra Lodge is located in the middle of Lamington National Park, a UNESCO World Heritage listed area that includes Australia's largest remnant of sub-tropical rainforest. Mountain scenery, lookouts, waterfalls, caves and gullies are traversed by more than 160kms of walking trails. The area supports a diverse range of rare and endangered animals and more than 230 bird species. The rainforest in which Binna Burra situated is also well-known in the scientific community for its diverse range of fungi.

Binna Burra is located in the Scenic Rim tourism region. The region received approximately 1.3 million visitors in 2016 (Earth Check, 2017). Eighty percent of these were domestic day visitors, 18.8% were domestic overnight visitors, and 1.3% were international visitors. The latter were predominantly from the UK, USA, New Zealand and Germany. Asian visitor numbers are small but growing. Although international visitors only comprise a small portion of the regions market, they account for nearly 30% of visitor nights, and stay an average of 10.8 nights in the region. Binna Burra's potential to expand into emerging and new markets is considerable given that it is less than an hour's drive from Queensland's popular Gold Coast and 90 minutes from Brisbane International Airport.

Key Features of the Design of the Sustainable Visitor Experience

The four key visitor experience elements linked to sustainability in this design activity were:

- Enhancing the rainforest experience for more casual visitors in a way that minimizes potential negative impacts on the visited environment;
- Incorporating clear take home sustainability messages that directly and explicitly link the interpretation and on-site experience to post-visit sustainability actions;
- Using social media to develop a virtual community to support ongoing sustainability action at home; and
- Creating a story to structure and enhance the interpretation.

Enhancing Visitors' Rainforest Experience

Apart from the ambience associated with staying at either the Binna Burra Lodge or camping in the adjacent national park campsite, the main option for a rainforest experience is to walk on an existing trail. A range of trails are available including some short walks on hardened trails. The majority of trails are, however, primarily designed for those who come for at least a whole day, and have sufficient hiking experience, physical capability and equipment to complete longer walks. There is some interpretation available, mostly on signs at the start of trails, or on maps and brochures that must be purchased from the National Park Information Centre or from the Binna Burra Lodge gift shop. Visitors who stay at the Binna Burra Lodge may also participate in shorter guided walks. Visitors without these affordances, including families with young children, older

visitors, those less physically able and those with little or no rainforest walking experience, are limited to short walks with very little interpretation. While many birds can be heard, very few can be seen and during the day few other wildlife species are likely to be encountered. One of the short walks includes a viewing point out over the landscape but the others are mostly enclosed in the rainforest. Some older signs identify larger trees, but overall visitors must create their own understanding of what they are seeing.

Fungi, including a variety of mushrooms, lichens and molds are not only critical to this rainforest ecosystem due to their role in nutrient recycling, but are also easily visible from the existing hardened trails at all times of the day and throughout the year. The authors chose to use fungi for two reasons. Firstly, the process of searching for fungi encourages visitors to slow down and engage in more attentive search behaviour in the rainforest, giving them a focus for their walk. As a variety of fungi in different colours and shapes are easily seen from the trails, there is also a sense of achievement for visitors in finding them. This gives visitors a more immersive and rewarding rainforest experience on the hardened trails, and thus minimizes visitor numbers and potential impacts on the longer, less hardened trails. Secondly, the role of fungi in breaking down nutrients and making them available to other plants in the rainforest is a simple, easily explained, immediately visible one that can be directly and explicitly linked to a take home sustainability action message. This meets several of the requirements listed by Moscardo and Hughes (2018) for encouraging visitors to engage in sustainability action.

The proposed interpretation includes a small fungi interpretive display in one of the garden areas of the Binna Burra Lodge that explains the role of fungi in the rainforest ecosystem, presents additional information about the importance of fungi beyond the rainforest, provides guidance about where on the trails fungi can be found and how to search for them, and gives a take home sustainability action message.

Incorporating Clear Take Home Messages about Beyond Site Sustainability

Figure 1 provides a proposed interpretive display panel focused on a take home sustainability action message around composting. This panel comes after three other panels that provide information on fungi and nutrient recycling and their particular efficiency at breaking down dead

matter such as fallen leaves and tree trunks and making it easily available to rainforest plants. The link between fungi and the breakdown and recycling of organic matter is easily linked to home composting and the recycling of organic waste in households. The panel also seeks to directly address any perceived barriers to engaging in composting and highlights personal and wider benefits.

Use Social Media to Develop a Virtual Community to Support Ongoing Sustainability Action at Home

The proposed interpretive panel in Figure 1 includes a hashtag #fungiatBiannaBurra and encourages visitors to post images of their own composting adventures, including their successes, failures and advice to others. There are several other references to social media in the proposed interpretive display. For example, there will be a panel that provides guidance on how and where to find fungi in the rainforest. One major element of this panel is images of fungi seen by recent visitors on the hardened trails. These images will be collected by encouraging visitors to post their fungi photographs to social media using the hashtag #fungiatBinnaBurra. This approach will make the information immediate and vivid, an important feature of effective persuasive communication (Bailey et al., 2015). Furthermore, this simple use of social media has the potential to create a virtual social community or collective that provides advice and support for sustainability actions (Hofman & Hughes, 2018; Hughes, 2011; Velasquez & LaRose, 2015).

Finally, the proposed interpretive display uses a story to capture visitors' attention, help them make personal connections, and assist them to understand and remember the fungi information that is presented. A story built around the characters and plot points in Table 1 will be presented on a series of signs that are interspersed between the traditional interpretive panels in the proposed garden interpretive display. Following the story line will lead visitors past the seven proposed interpretive panels. Table 1 shows where each plot point is linked to one of the proposed panels. The aim is to encourage visitors to read at least the main message in each panel and to follow the lead of the fictional family in searching for fungi on the adjacent rainforest trails.
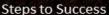
FUNGI: THE F-WORD YOU CAN SAY AT HOME

Most plants and soils are eager to start a relationship with fungi - so how can you help keep our planet healthy? Probably one of the best ways is by composting. It's easier than you think!

Benefits for you & the environment
- Rich soil that your plants will love
- No more smelly rubbish bins
- Reducing landfill
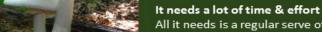- Knowing that you are helping Mother Nature
- It's free!

Steps to Success
1. Build an open-topped box or buy a composting bin
2. Add compostable items (food scraps, plant material, grass, hair/fur, paper, shredded cardboard)
3. Check the compost remains moist but not wet. If it gets wet, add paper. If it dries out, add more food scraps, garden waste and/or water.
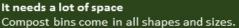
Myth Busting
It stinks!
Not if you use a variety of materials. Lift the lid of the box below – this rich organic scent is the smell of well-balanced compost.

It needs a lot of time & effort
All it needs is a regular serve of fruit & vegetable scraps and garden waste – nature takes care of the rest. In 6-8 weeks you'll have beautiful organic soil – see our time lapse photos below.

It needs a lot of space
Compost bins come in all shapes and sizes.

It's only useful if you have a garden
Pot plants and indoor plants love compost too!

Post photos of your compost, garden or pot plants with #fungiatbinnaburra
Share gardening/composting tips

Figure 1: Mockup of an Interpretive Panel with Sustainability Action at Home Message

Using a Story to Structure the Interpretation

Table 1: Character Summary and Main Plot Episodes for Proposed Binna Burra Fungi Story

Story Elements	Element Details
Characters	*Tom* – Retired biochemist who has recently lost his wife, Sandra, to cancer. Tom and Sandra were keen bushwalkers. They met on a bushwalking trip at Binna Burra and were regular visitors throughout the years. They retired to Nerang so they could keep bushwalking at Binna Burra. They also spent a lot of time in their huge garden with Tom focusing on his composting, prize winning orchids and extensive herb and vegetable garden. Sandra loved to make bread and in more recent years had spent a lot of time experimenting with fermented foods. Tom loves his only child, Chantelle very much and when she was a little girl he often went hiking and camping with her at Binna Burra. He was, and still is, a great story teller and many of trips included a search for a magical mythical mushroom that supposedly had the power to help them see fairies. As Chantelle grew older, her interests changed and she began to spend more time with her friends and then the job in Canada, a Canadian husband and her own family had kept them from spending much time together. Tom would like to find a way to reconnect not just to Chantelle but also her twin children Finn and Faith.
	Chantelle – Tom's only child who has lived in Canada for the last 20 years and recently returned to Brisbane to take up a new job, start again after her divorce, and spend more time with her dad now her Mum has passed away. Chantelle is a food scientist searching for that new ingredient to make food amazing in some way – maybe something that might make vegetables taste like chocolate? She's a single mum, so if she could find that one new thing she might be able to ensure her family is financial secure but also make a positive difference to the world.
	Finn and Faith – Chantelle's twin 10 year olds. Born and raised in Canada, Faith and Finn have only ever had short visits to Australia so don't know their grandfather Tom very well. He seems a bit gruff and a little scary. Finn isn't happy about the move to Australia - he misses his friends and spends a lot of time on his tablet playing games like Plants versus Zombies, but he did love the wilderness in Canada. Faith shares her mother's childhood interest in fairies and is fascinated with tales of the weird and wonderful. She especially loves fairies and Alice in Wonderland.
Context	Chantelle takes the children to stay for a week or so with Tom during their first school holidays. She wants to rebuild her own connection to Tom, but also hopes that he and the twins can find some common ground and start to build some real family relationships.
Plot Episodes	1. Chantelle sends the twins out to work in the garden with Tom. They find a small ring of mushrooms in the lawn and Tom points out the fairy circle telling Faith why people call it that. Finn is unimpressed, it's just a bunch of useless mushrooms. Tom explains that mushrooms are not useless, they are fungi and without fungi all the plants on the planet would starve. He briefly describes nutrient recycling.
	[link to a panel labelled Fungi: Foundations of the Rainforest which provides information on the role of fungi in nutrient recycling and the importance of this for the rainforest ecosystem]
	2. Tom takes the children to see his orchids and further explains just how important fungi are. Faith loves the orchid flowers but Finn still looks unimpressed. Tom remembers all the zombies in Finn's games and tells him about fungi and zombie ants.

[link to a panel labelled Fungi: Friend or Foe which talks about symbiotic relationships between fungi and plants and how fungi spread their spores through zombie ants and caterpillars]

3. Now Finn is interested. They go inside for lunch. Both Faith and Finn are keen to tell Chantelle about fungi, zombies, fairies, and orchids. Chantelle encourages their enthusiasm talking about yeast and moulds and all the foods they love to eat.

[link to the panel labelled Fungi For the Living and the Dead which lists the different ways in which fungi are linked to human food production and medicines]

4. Chantelle remembers her Binna Burra childhood trips and she and Tom happily recall their adventures searching for the mythical magical mushroom that would let them see fairies. Maybe a fungus could be that magical new food taste Chantelle's been dreaming about. Tom recalls reading some interesting things about new uses for Fungi and all four of them search the internet for fungus uses.

[link to panel labelled Fungus for a Fantastic Future which explores projects looking at using fungi for new for sustainable materials to replace plastic and using fungi to break down plastic and other inorganic waste materials]

5. While Tom and Faith take the lunch food scraps out to the composting bin, Faith suggests that they go on a mythical magical mushroom hunt. They go back in to tell Chantelle and Finn and they all decide to go on up to Binna Burra to walk and search for fungi in the rainforest

[link to the panel labelled Fungi: The F-Word You Can say at Home which is focussed on the take home sustainability action message - see Figure 1]

6. As they drive up to Binna Burra they enjoy swap stories about mushroom's, fairies and zombies. Both Chantelle and Tom are feeling good about this trip, the twins are excited and Finn is talking, no tablet in sight.

[link to a panel labelled Fungi: Fiction, Folklore and Fairies which looks at the role of fungi in folklore and fiction across time and cultures]

7. After they park and while they are getting ready to walk, Tom gives the twins some hints on where to look for fungi

[link to a panel labelled Finding Fungi: Fun in the Forest which provides advice and support for finding fungi on adjacent rainforest trails]

8. As they head off on the track, Chantelle is thinking it doesn't matter whether nor not they find the magical mythical mushroom or the fungus that is going to make her fortune, Tom and the twins seem to be having a great time together so her mission is accomplished.

Issues to Be Addressed

The development of this visitor experience will need to address three major issues or challenges – ensuring consistency with Binna Burra Lodge's sustainability actions, incorporating Indigenous elements into the interpretation and experience, and making the information available in multiple languages. The major take home sustainability message for guests from the proposed fungi interpretation is that they can and should be engaging in more composing of organic waste. This message will emphasize the benefits of composting in general, as well as its practical application in growing healthy plants and gardens. Visitors are likely to ask about and expect there to be composting at Binna Burra Lodge - we predict there will be interest in seeing a larger composting program in place. Moscardo and Hughes (2018) argue that it is important that tourism businesses are consistent in the way they present their sustainability actions and that they 'practice what they preach'. Seeing a tourism business like Binna Burra Lodge engaging in environmental programs also provides social modelling of the desired behaviours, which has been shown to support guest adoption of the desired actions (Antimova, Nawijn & Peeters, 2012). If the proposed interpretation is installed, Binna Burra Lodge will need to seriously consider establishing a composting program for organic food waste that can be accessed by guests as part of 'behind the scenes' tours. Similarly, the Lodge could consider growing their own herbs and vegetables, perhaps in small containers to demonstrate the options for those living in urban areas. This modelling is critical, as Baker, Davis and Weaver (2014) argue that guests can be skeptical about sustainability communications when they do not see the businesses engaging in consistent actions.

While many World Heritage listed areas in Australia have been inscribed and protected for their natural environmental values, they are often very important in the history and cultural practices of their Traditional Owners. Indigenous groups have often disputed the lack of listing for cultural values and expressed concern over their limited role in the management of these protected areas (Lilley & Pocock, 2018). The Traditional Indigenous people of the Lamington National Park region are the Yugambeh People. An examination of existing published sources did not find any mention of Yugambeh use of, or connections to, fungi in or around Lamington National Park. But the available information is limited and it is likely that these Traditional custodians may have important knowledge and expertise to contribute to this visitor experience design project. Development of this project will require consultation with the region's Traditional Owners.

Finally, the information available on the tourist markets accessing the regions around and adjacent to Binna Burra Lodge show there's an increasing diversity. This is driven both by growing numbers of international tourists from Asia, especially China and India, and increasing migration from Asia contributing to a more diverse domestic tourist mix. While the proposed visitors rainforest experience changes described in the present paper are specifically designed to support visitors with more diverse backgrounds, it is currently only available in English. This could be a barrier to many of these new visitors. Typically, natural environmental managers respond to this challenge by offering signs in a second language, usually selecting the most common. This can be problematic when there are multiple alternative languages as it is not feasible to include multiple languages on fixed media such as signs. The decision to choose only one or two languages can also be perceived by other visitors as indicating that they are of lesser importance to managers. The rise of mobile usage and the potential to use mobile apps, which can easily present the fungi interpretation in multiple languages, is a potential solution. Currently, mobile coverage in the Binna Burra area can be variable but with improvements to the infrastructure this could be a solution in the medium to longer term.

Future Hopes and Conclusions

This project explores ways of enhancing the sustainability of visitor experiences in fragile natural areas and is currently in its design phase. The next step is to work with various stakeholders such as Binna Burra Lodge management, the Friends of Binna Burra community group, representatives from local Indigenous groups, parents, teachers and current visitors to ensure the proposed interpretation has appeal and applicability. If adopted, the proposed interpretive messages and activities will be formally evaluated and their impact on on-site and post-visit behaviour assessed.

The project includes a number of innovative elements. First, protecting the natural environment from the potential negative impacts of increasing visitor numbers was at the forefront of the design. By focusing on the short trails near the Lodge, the proposal nudges visitors to stay in the areas that are already site-hardened. The added advantage is that this approach provides enrichment experiences for those with limited time, experience and physical ability. This inclusive approach

should increase its appeal to families with young children, a target market that is not currently accessing the site in large numbers.

Second, the entire interpretive display is supported by a story that links together the different messages and panels. This provides a clear structure and should increase the appeal of the interpretive activities and messaging to a variety of target markets. Third, the proposed interpretation includes clear strategies for action that address common barriers and provide support and instructions for success. Benefits for both the environment and the individual are clearly outlined to further enhance the persuasiveness of the messaging and prompt action. Finally, the project proposes the use of social media to create a community that supports and inspires environmental action beyond the tourist experience itself.

We hope sharing this example will help others to design tourist experiences that engage, inspire and immerse visitors in the natural environment. Time will tell whether the approaches proposed here will have long-term positive impacts on visitors' environmental knowledge, attitudes and behavior, but given that the design has been informed by previous studies in the areas of persuasive communication and sustainability action, we remain optimistic.

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