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The Effectiveness of Wayfinding Systems with Forest Users

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Abstract: Forest wayfinding systems include the sources of information, content and presentation, that potential visitors use to find forest sites and maximise their experience of forest recreation. This paper presents original research from an on-going user-led study of signage at forest recreational sites across the UK, and is part-funded by the Forestry Commission. Research methods used in the study included structured interviews with forest users, a signage audit, observation-based behavioural studies and exploratory work with space syntax. The starting point for the study was an apparent low rating of satisfaction with road signs by visitors to Forestry Commission sites in annual visitor surveys. Signs are "…the most visible manifestation of corporate face" and function to "…provide reliable and accessible information to encourage and welcome visitors" (Forest Enterprise Signs Manual, 1997). Good signs also form part of a positive perception of woodlands (Burgess, 1995) and may be considered within the context of removing barriers to the use of the countryside by disabled people and socially excluded groups.
The research found evidence that there were some problems with forest wayfinding, but that these problems are related more to the context, content and location of signs, rather than the materials and details of sign design. More consideration needs to be given to identifying the minimum but key information needs of users at key locations within the forest site. Signs are costly to design, construct, install and maintain, and a crucial concern must be to provide the minimum information for maximum benefit, based on what the user needs to know at each stage of the journey and forest experience. The study also highlighted the role of signage in site promotion, visitor expectations, conflicts between different user groups and accessibility of information. A model for signage to satisfy visitor information needs was developed. The results presented here cover phase 1 of the project and it is anticipated that the methodology developed during the research will have practical applications in evaluating and developing new signage systems, and the training of forest and other recreational site managers.

INTRODUCTION

The starting point for the study was an apparent low rating of satisfaction with road signs and information boards by visitors to Forestry Commission sites. Against this background, a research project was commissioned by the Forestry Commission to consider issues of forest wayfinding and to develop methodologies for assessing wayfinding systems. The first phase of the study, which is presented here, was a scoping study to consider whether:

1. users (who want to) were finding their way to Forestry Commission recreational sites,
2. the information provided on site enabled visitors to use the site effectively once they were there.

A key aim of the study was the development of a pilot methodology for FC and public participation in the evaluation of signage procedures.

Wayfinding is '…the ability to identify one's location and arrive at destinations in the environment, both cognitively and behaviourally' (Prestopnik & Roskos-Ewaldson, 2000), or, more simply 'spatial problem solving' (Passini, 1992). Wayfinding ability appears to differ between individuals depending on gender, sense of direction, familiarity with environment and wayfinding strategy (Prestopnik & Roskos-Ewaldson, 2000; Lawton, 1996). In the context of the present study of forest recreation, wayfinding was defined as the search processes and sources of information used by visitors to locate, arrive at and maximise their experience of recreational sites. Signs are a key source of wayfinding information, often supplemented by leaflets, maps, personal contacts and word of mouth.

Signs are a visual means of conveying information or messages from site managers to potential users of that site. Beazley (1969)identified the function of signs, the first to "…provide a visual target that is quickly seen; the second, to convey a message. An additional objective… is that it should impinge as little as possible on its surroundings while fulfilling the first two requirements." Various types of signage messages and information are suggested in the literature (Brown, 1974; US National Parks Service, 1988;

Burgess, 1995; Forest Authority, 1996; Forest Enterprise, 1997; Winter, 1998). These include site promotion and directions, visitor welcome, information about the site and its facilities, visitor orientation, education and interpretation, advisory and warning signs, and corporate image and promotion.

Visitor information needs can be perceived as arising out of a series of actions and decisions that occur in sequence according to what the user wants to know at each point. Accordingly a hierarchy of sign types has been developed by (See Table 1).

Sign type	Definition
Pre-arrival	Advance roadside warning
Threshold	Marking the main entrance to the area of management or ownership
Orientation	Helping people to locate themselves, before deciding where to go and what to do
Direction	Guiding traffic and pedestrian navigation
Identification	Labelling a feature of object
Information	Displaying details of opening hours, events, facilities
Interpretation	Revealing the significance of the landscape or an aspect of it
Regulation	Displaying rules and warnings.

Table 1.Signage hierarchy for outdoor recreational sites (Scottish Natural Heritage, cited in Bell, 1997).

The significance of pre-arrival signs was recently highlighted in a report to the Countryside Agency (1998) which suggested that a lack of signs and directions was a significant barrier to potential users of the countryside. Pre-arrival signs take the form of roadside warnings such as tourism brown signs and other highway signs. In the UK, standard white-on-brown tourism signs function to: "...guide visitors along the most appropriate route at the latter stages of their journeys [to places they were already intending to visit], particularly where destinations are difficult to find…or to generate impromptu visits by supplementing marketing initiatives" (County Surveyors Society, 1996). Tourism brown signs are administered by the Traffic Authorities, who seek to balance tourism development with road safety, traffic management and environmental objectives. Destinations must meet the basic quality standards of the Tourist Board Visitors Charter to qualify for Tourism brown signs. Alternative signing systems are offered by commercial organisations such as the Automobile Association (AA) and the Royal Automobile Club (RAC).

Visitor surveys carried out by the Forestry Commission indicate that most people arrive by car. However, the National Trust (2000) identified the needs of the 'transport poor' and stated that it was: "…not acceptable [for major developments] to be designed and located on the assumption that the car will represent the only realistic means of access to the site for the majority of people." At present most wayfinding signs to recreational sites are aimed at car users.

Threshold signs announce that a special area has been arrived at, welcome visitors, and also raise awareness of the organisation or landowner responsible for managing the site (Bell, 1997; Forest Enterprise, 1998; Winter, 1998). Threshold signs, are often "…the most visible manifestation of corporate face" (Forest Enterprise, 1997) and suggest the type of experience to be found on the site, as well as the standard of facilities on offer. Burgess (1995) studied the perceived fears and risks of various ethnic and social groups about visiting urban fringe woodlands. She considered that good signs formed part of a positive perception of woodlands, and that by encouraging more people into woodlands, a wider and more varied mix of users might be attracted, thus in itself helping vulnerable users to feel safer. She also suggested that by identifying and highlighting woodland character (such as open, middle or wild-woods) users might be able to assess whether they would feel comfortable using a particular site.

Once on site, visitors require additional wayfinding information in order to "…find their way around the site without getting lost, straying into danger or missing the best features" (Bell, 1997). Burgess (1995) observed that although men tended to be afraid of becoming lost or trespassing, women were more fearful of attack, and felt vulnerable when lost. Good maps and signage were important to let people know where they are and also where to go in times of anxiety.

Interpretation and education about the site is another vital area of visitor information which should provoke, relate and reveal as well as be accessible (Bell, 1997). A recent study by Gibb (2000) concluded that although 31% of the sites surveyed had wheelchair access, less than 3% of interpretation had facilities such as large print, Braille or an induction loop, for people with disabilities. The Disability Discrimination Act of 1995 has given added incentive to improving the inclusiveness of wayfinding systems in order that disabled people, particularly those with visual impairment do not experience 'information deficit' (Barker & Fraser, 2001).

METHOD

The approach chosen for the study was user-led and multi-disciplined. It comprised a series of site-based case studies, consisting of semi-structured interviews with visitors, a signage audit of the site and its environs, and route analysis using a combination of spatial and behavioural analysis techniques. The sites chosen for the case studies were: Queen Elizabeth Forest Park (OS map reference NN520014); Glencoe Lochan (NN104596); Cannock Chase (SJ 019171); Dalby (SE875874) and Hafren (SN 857869), which

encompassed a range of geographic locations, size, and foret experiences, as well as different levels of visitor satisfaction with road signs (see Table 2).

The first time user experience.

Researchers set off for each site with the minimum of information to hand, normally no more than the AA 2000 road map and an FC leaflet, and approached the site using only visual prompts, whether signage or symbols on the road map, and written directional instructions on the relevant FC leaflet.

Interviews with forest users

Structured interviews were carried out with visitors at the sites. The interviews were divided into sections, designed to follow the sequence of arriving and spending time on the site:

- About your visit here today
- About your journey here today
- About your arrival at the forest
- About the information and directions provided

Route Analysis

The nature and complexity of potential routes into each of the forest site was examined from the nearest population centres or holiday locations. Techniques included a signage audit, behaviour-environment analysis and a brief exploration of Space Syntax.

A, Signage audit

Actual signs locations as *experienced* by the user on their journey to the site were then catalogued and mapped using the following categories:

- Environs: the route to the site, up to the entrance, including significant major/minor road junctions, tourist brown signs, FC advance, threshold, and entrance signs.

- Local*:* the entrance up to the main information point, whether visitor centre or information board, including traffic flow directional signage, car park, signs to VC/information board, directions to start of trails or other facilities.

- Signs were recorded and assessed for:
- Location and appropriateness
- Visibility, legibility, accuracy
- Understanding/comprehension
- physical condition, confusion and clutter.
- Conformity to best practice guidelines.

B, Environment-behaviour analysis

This was carried out on an informal basis to assess signage effectiveness, and also to help put visitor comments into context. Two approaches were combined: observation records and spatial analysis. Observation points were selected in locations previously identified by the researchers as information 'trouble spots.' Visitor behaviour and interactions with the environment were recorded in the form of movement maps and annotated sketches. Spatial analysis encompasses a range of techniques frequently employed by Landscape Architects to evaluate the spatial experience of a route or landscape, by breaking it down into a sequence of visual images such as photos and sketches. These two approaches were used to analyse the 'goodness of fit' between user information needs and the information provided by the environmental setting.

C, Space Syntax

Space syntax is an exploratory technique used in spatial analysis (Hillier & Hansen, 1984). Its basic model is a transformation of the total spatial system of an urban situation in axial lines, which are defined as the fewest and longest set of lines of accessibility and visibility that can be drawn. The model is then analysed according to the connectivity of each axial line to all others in the system. In wayfinding, these intersections may be interpreted as locations where decisions are required. Lines are then analysed for global and local integration. Global integration - a measure of accessibility from all other parts of the spatial system – can then be used to identify suitable routes. Local integration – a measure of the accessibility of an axial line from its neighbouring lines – reflects the number of choices at junctions and the potential points of confusion. Due to time limitations and the exploratory nature of applying the technique in an open landscape context, it was only possible to use Space Syntax on one of the sites used in the present study (Hafren). Axial lines of accessibility were derived from roads on Ordinance Survey (OS) maps.

RESULTS

Full results from all the case studies which amalgamate all the techniques mentioned in the above methodology, are available in the final project report (Findlay et al., 2001). In this short paper it is only possible to present a selection of the data obtained.

Route analysis

The key approach routes used by visitors were identified from interviews with Forestry Commission personnel, forest users, Tourist Information, maps and 'scouting' by the researchers (see Table 3.). At Hafren route identification was reinforced by space syntax, which highlighted a local town which spatially dominated the area, a natural route to the forest through this town, and intersections which might cause confusion.

Site	Road sign rating	Size (ha)	Annual visitors (000's)	Main Visitor type	Use	Transport	Other considerations
Queen Elizabeth Forest	74.5% (1998)	20,000	1,000	Tourist	Walk Cycle	Car Coach	Proposed National Park. Major tourist route.
Glencoe Lochan	44 .0% (1999)	137	30	Local Tourist	Walk Fish Disabled access	Car Walk	Emphasis on disabled people. Local amenity within a major tourist destination area
Cannock Chase	62.0% (1999)	2428	106	Local	Walk Cycle	Car Walk	Close to large population of people from ethnic minorities. Forest in a country park
Dalby Forest	81.3% (1997)	3642	300	Tourist	Walk Cycle	Car	Within National Park. A forest drive
Hafren Forest	38.3% (1998)	3000	20	Tourist Local	Walk	Car	Bilingual issues

Table 2. Matrix of site factors for sites used in study.

Site	Possible routes	Road type
Queen Elizabeth Forest	2	'A' class roads
Glencoe	2	'B' class or minor roads
Cannock Chase	5	Minor roads
Dalby	2	Minor country lanes / 'B' Class roads
Hafren	4	Narrow country lanes

Table 3. Site approach routes

Three of the sites (Hafren, Glencoe and Cannock Chase) had no road signs; the only signage was that provided by the Forestry Commission at the forest threshold. Queen Elizabeth was signed using generic tourism brown signs as part of the 'Trossachs Trail'; Dalby had tourist brown signs, 'repeater' signs (a brown-on white pictogram) and highway signs. On-site Forestry Commission signage was recorded onto site plans and matched with comments from the visitor interviews.

Examples of environment-behavioural analysis included a comment that there was no information at the entrance to Queen Elizabeth, with the observation that, in reality, however, most information was obtained by talking to the man responsible for collecting parking fees. At Glencoe, visitors treated the car park and information board like a drive-through, travelling in circles while deciding whether to stop and park. At Cannock Chase, the technique was used to identify potential information needs around the entrance.

Visitor interviews

In all 68 structured interviews were carried out with users across the five sites. User groups were predominantly couples (n = 29) or families (n = 20), with fewer miscellaneous small groups (n = 11), lone males (n = 5) or females (n = 1). There were also 2 accompanied parties of users with learning disability. All visitors were White Caucasian; no visitors from other ethnic groups were encountered. Most visitors travelled to the sites by car (n = 60); very few cycled (n = 3), walked (n = 3), or came by coach or minibus (n = 2). Nearly half of the visitor were making their first visit to the sites (n = 33), while some made regular (n = 17) or occasional visits (n = 18).

Awareness of site

At Cannock Chase the site itself is called Birches Valley Forest Centre, however local visitors referred to the site variously as Birches Valley, Beeches Valley, the Deer Centre, Brindley Heath and Cannock Chase. The latter two references suggested confusion with a nearby visitor centre run by the local council, and which had more dominant road signs. This example gives some indication of the difficulty in finding information about a site when there are problems of site identity. Across all sites, most visitors first heard of the sites through word of mouth (n = 14), had 'always known' (n = 13), or from guidebooks (n = 12). Few had found information from Ordinance Survey maps (n = 7), Tourist Information offices or leaflets (n = 6), or 'by accident' while driving past (n = 5). Only 4 visitors mentioned signs; the remainder of reasons for first finding out about sites included looking for a café, by prior research or from a magazine.

Finding the site.

Visitors cited a number of wayfinding strategies including the use of maps, verbal directions and landmarks. Some were not able to explain: 'I just followed my nose' or used 'instinct'. On signage, one visitor claimed to have followed signs to Glencoe, when in fact there were not any. At Cannock Chase a visitor remarked that '..you don't stand a chance of finding it as there are no signs', and at Dalby '..it's well-signed – you can't miss it'. At Hafren, visitors identified particularly difficult junctions where signage would have been helpful. Problem junctions were often reinforced by Space Syntax analysis.

Arrival and finding out what to do

There were criticisms of the information boards on several of the sites, particularly the map representations and details of trails. At both Hafren and Glencoe, the car parks were small and laid out in a way that visitors could see at a glance that they had arrived at the right location, and any information boards were immediately obvious. At Glencoe, visitors commented on a lack of information e.g. about the fishing. This information was available on the site but not immediately obvious.

At both sites the map representations on the information boards were criticised. Several visitors remarked that details of the difficulty and duration of trails given on the information boards was over-estimated. One visitor was also confused by the site motif used on all the trailheads[7]. At Cannock, the site entrance was obvious, but there was no formal information board to indicate what was on offer at the site. Visitors were also confused by the pictograms on some of the directional signs at this site. At Dalby, information was available from the toll booths, but only when they were manned, and the road layout indicating car parking was not immediately clear to visitors. Queen Elizabeth Forest Park had long-standing problems with signage and design of the site entrance. where the requirement to remove traffic quickly from a busy 'A' road did not allow visitors time to absorb entrance information and directions. Once parked visitors were then unsure where to go for further information about the site. Site information was centralised at the Visitor centre, however this was neither visible nor clearly signed from the car parks.

Visitor conflicts

The intention to attract visitors to the site by signage and promotion was not always matched by site carrying capacity, ability to cope with diverse user needs, and possible conflicts between user groups. Although the actual forests can absorb large visitor numbers, this was not always the case with visitor facilities such as car parking and toilets.

None of the sites visited were accessible by public transport, and no visitors from ethnic minority communities were encountered at any of the sites, even though one site (Cannock) was within commuting distance of Birmingham with its large and mixed ethnic population. Visitors with some disabilities such as people who use wheelchairs were catered for with a specially designed boardwalk at Hafren, and boat for disabled people at Glencoe. However people with a visual impairment, limited mobility or learning disability were not catered for. Conflicts between visitor groups were particularly apparent at Cannock, where there was obvious tension between cyclists and pedestrians using the same trails. However at Dalby, cyclists and walkers were segregated and so this was not an issue.

[7] All forestry Commission sites have a motif which evokes the sense of place e.g. red feathers at Glencoe to suggest the connection with British Columbia.

DISCUSSION

The first phase of this scoping study highlighted a number of general issues, which will help determine key areas for future work. It was also useful in the development of a methodology to be used in future phases of the study, as well as in training packages to those responsible for sign design and assessment. The general issues were site promotion and encouraging more visitors to the site, site location and context, visitor wayfinding strategies, visitor expectations and accessibility of information.

Site Promotion

Road signs were generally located within a 5 mile radius of the site and, although they may to some extent attract visitors passing through the area, wider promotion of the site appeared to be necessary to inform potential visitors about the site. Site promotion included Tourist Information Offices, leaflets, local radio and newspaper, other published references to the site, and word of mouth. The last often revealed special and long-term attachments to particular sites.

Encouraging more visitors to the site.

The study began by asking whether visitors *who wanted to* were managing to find the sites. This entailed some consideration of whether both *quantitatively* and *qualitatively* more diverse categories of visitors might wish to use the site. It was noticeable that certain user groups were under-represented in the visitor samples, including non-car users, disabled people, people from ethnic minority groups or areas of social deprivation. These groups are currently the focus of government policy on social inclusion. Such policies raise questions such as: if more visitors are attracted to the site – can the site cope given the limitations of its present facilities e.g. car park capacity, toilets, size of visitor centre, as well as potential user conflicts?

Site location and context

The visitor survey highlighted widely differing ratings of satisfaction with road signs, which to some extent may be related to intrinsic - and therefore difficult to alter - site factors such as road hierarchy and layout, as well as site topography.

Visitor wayfinding strategies

Visitors cited a range of wayfinding strategies which included following road signs, using road maps, OS maps, verbal directions from friends and family, landmarks and the less conventional. Awareness of the diversity of wayfinding strategies can be used both to evaluate and inform wayfinding systems.

Visitor expectations

Arrival signage sets the scene for visitor expectations of the site and should be designed to give some indication of the kind of forest experience and standard of facilities that visitors are likely to encounter. With few exceptions, visitors were pleasantly surprised by the range of forest experiences on offer, and associated the Forestry Commission brand with a high standard of car-parks, toilets and other recreational facilities. This suggests that good provision is not matched by good information prior to arrival.

Accessibility of information

Despite the limitations of visitor sampling in this first phase of the project, some observations and comments may be made about the accessibility of information, particularly when viewed within the broader issue of social inclusion. Information boards did not appear to cater for the needs of the full spectra of disabled people's needs, for example those with restricted mobility or visual impairment. The issue of language accessibility was also highlighted. Dual language signing in Welsh or Gaelic appeared to be a policy issue, even though this doubled up the quantity of visitor information. Some visitors queried the increasing use of symbols and pictograms, many of which were poorly comprehended, suggesting this is not a straightforward answer to language accessibility.

Development of methodology

The development of a pilot methodology comprised

A, The FC perspective

Exploratory interviews with FC personnel – Forest District Managers, recreation officers, rangers and others such as toll collectors, shop staff and car park attendants – were useful in building a 'picture' of the wider social, historical and political context of the site, and potential problems. FC experience was a valuable source of information about the sites, and the recreation officers in particular had considerable insight into site issues and user profiles. However, it was sometimes appropriate for the researchers to experience the site themselves before consulting with FC personnel, in order to contribute a fresh perspective.

B, The user perspective

An early determinant of the study was that it should be user-led, and so a key element of the study was that user perspectives and behaviour were considered first and foremost. In-depth qualitative interviews, loosely based on a Personal Construct Theory approach (Kelly, 1955) were used. This involved probing the responses of interviewees on their experiences of wayfinding to and within forest sites. By continually probing " how?…in what way…?" considerable insight could be gained into the user perspective of issues that might be overlooked by forest managers and FC personnel. In addition, by using the interviewees' own words, rather than constraining their responses to the fixed vocabulary of questionnaires, a deeper rapport was possible.

C, Observation

It was also useful to observe visitors' behaviour – how they responded to signage and how their behaviour appeared at times to contradict their responses. At QEFP, drivers were clearly observed hesitating at the main entrance from the road. At Dalby, a woman complained that there was no information in the shop, although she did not actually ask shop personnel for assistance. FC personnel at Dalby remarked that by observing visitor behaviour at 'problem' areas they were able to fine tune signage and experiment by moving or subtly changing the existing signage.

D, Route Analysis.

Using an OS map, camera, sketch book and the landscape architect's training in spatial analysis, a visual map of all the signs and the context in which they occur, was built up. This necessitated an assessment of the experience of signage at driving speed in the specific landscape setting, whether urban or countryside. Signs that appear obvious at walking speed, may not be assimilated at driving speed. A helpful approach was to study signage as a series of questions:

- at a given time what is the most important thing people need to know?
- is the sign at the right place? – visibility and legibility?
- is a sign appropriate? – content and style.

Eventually this approach led to the creation of a number of illustrative plates which analysed the experience of signage in a visual way.

E, The first-time user approach

The sites were investigated by the researchers using a 'detective-style, under-cover' approach. The researchers were provided with the same level of initial site information as the first time visitor – an AA Road Atlas and an FC leaflet (where available). This deliberately naïve approach enabled the researchers to experience sites from a user perspective.

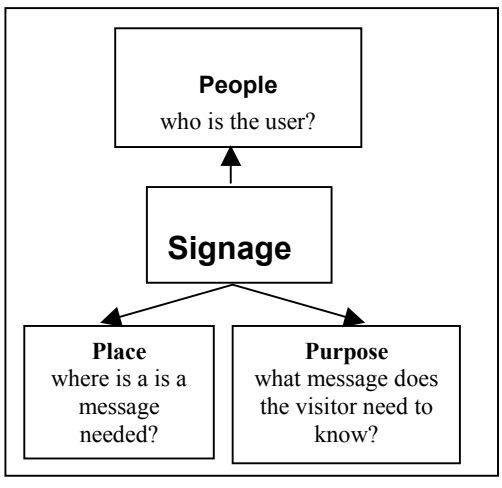

Figure 1. A signage model

Towards a signage model

A signage model (see Figure 1) was proposed to demonstrate the inter-relatedness of the various aspects of signage and wayfinding:

Recommendations for future work.

At the start of the present study it was acknowledged that this was the first phase of a larger project on forest wayfinding systems. The key issues in need of more in-depth investigation have been identified and a methodology developed that can be refined and applied to a wider range of sites. These key issues would appear to be :

- People - identifying existing, potential and 'missing' users of forest wayfinding systems within the context of social inclusion
- Purpose - identifying user information needs
- Place - identifying key locations where information is needed or can have maximum effect.

It is anticipated that the next phase of the study will comprise an 'experimental approach' and be the main data-gathering stage of the investigation seeking to address the challenge of :

i) Delivering minimum visitor information at key locations to maximum effect, in a cost-effective and appropriate manner

ii) Developing guidelines and training packages based on a refined, user-led methodology, for Forestry Commission personnel responsible for designing, implementing and evaluating wayfinding signage systems

iii) Identifying discrepancies in perception between users and providers of signage – i.e. 'goodness of fit' between the perceived information needs of forest users and FC personnel

iv) On-site signage experiments to investigate user responses to changes in signage, such as removing, moving or simplifying existing signs.

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