Coastal Defence and Earth Science Conservation

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14 Selling coastal geology to visitors

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Summary

- From the 1970s onwards several geological sites have been interpreted for general visitors.
- An appreciation of the perceptions, knowledge and understanding of geology that such visitors have is crucial to effective future geological interpretive and conservation management strategies.
- Geotourism, examined within the broader heritage and interpretation context, is considered as a model for such provision.
- The analyses of some of the data from four visitor study surveys undertaken in England are presented and contextualised within the broader interpretation framework.

Coastal geotourism

Geological conservation – addressing the seaside audience

Fossil hunting and pebble collecting are popular activities, especially during the holiday season, at tourist sites around England's actively eroding coast. The inclement out-of-season sea conditions create a ready supply, at the obvious and sometimes dramatic expense of subaerial hectarage, of new collectible material; such events reinforce the perceived need of civil engineers, planners, local populations and their politicians for coastal defences:

> Britain's rich heritage of internationally important geological sites is well known to engineers and geologists alike, but ... the undertaking of protective works on unstable slopes or cliffs designated as Sites of Special Scientific Interest bring conservationists and engineers into conflict. (McKirdy 1987).

Unfortunately, despite their potential to resolve such conflict, few geology interpretive schemes (Page & Wray 1995) which could enable the various constituencies to recognise and appreciate the commercial and academic value of such sites, have been developed.

Geological interpretation and the Public

Geology's interest and perceived value to visitors can be masked by complex terminology and a concentration on obscure detail. Ham (1992) has said:

> Environmental interpretation involves translating the technical language of a natural science or a related field into terms and ideas that people who aren't scientists can readily understand. And it involves doing it in a way that's entertaining and interesting to these people.

It is somewhat unfortunate that many interpretive schemes focus on Sites of Special Scientific Interest. Chosen for scientific, rather than interpretive, value, most have seemingly little to interest general visitors. The somewhat difficult task of interpreting such sites is hindered when basic interpretive principles on the informational, graphical and linguistic style and content of interpretive publications and (including their siting) panels, are neglected; for example, from an interpretive plaque at a disused Carboniferous Limestone quarry on the western edge of the Peak District:

> Limestones are sedimentary rocks composed of calcium carbonate ($CaCO_3$). They contain ancient shells and skeletons belonging to organisms ... CARBONATE MUDMOUNDS seen here high on the cliff face. The origin of these structures is complex although ancient algae are believed to have influenced their development. The more noticeable of the mudmounds has been shown to be inverted. It must therefore have been detached and transported from the original position before being incorporated into the bedded sediments here.

Site-focused interpretation programmes use either on-site display panels or trail guides; museum exhibitions and heritage centre displays are also commonly employed. Visitors to such sites can be categorized (Miller 1991) as at:

- Level One: generally curious, somewhat unknowledgable, casual visitors;

- Level Two: interested, having made a conscious decision to visit, visitors;
- Level Three: the, having made a conscious decision to visit, knowledgeable minority of visitors.

Most visitors to coastal recreational sites, including those with some evident geological interest, are at Level One.

Geotourism – the way forward?

The author's research on geological interpretation for such visitors, examines their nature, and on-site behaviour and develops the theme of geotourism which is:

The provision of interpretive and service facilities to enable tourists to acquire knowledge and understanding of the geology and geomorphology of a site (including its contribution to the development of the Earth sciences) beyond the level of mere aesthetic appreciation. (Hose 1996).

It is an interpretive strategy that promotes visitor awareness of the importance of, and need to conserve, geological sites with some general visitor interest. Interpretive provision to be effective must be widespread for, in the USA (Miller 1991), 'Studies consistently indicate that a single exposure in a zoo, museum or park program will have little lasting effect on a visitor. However, repeated exposure ... can have a significant and profound effect.' Geological conservation is an essential geotourism component; geotourists must be encouraged to collect only loose material, to notify professional geologists of important finds and to develop their photographic and artistic skills.

Past experiences and expectations

General interpretive considerations have emerged from the author's geology-centred and other workers' environmental-centred research:

1. visitors have past experiences that they bring to a site;
2. first impressions count – they influence future usage;
3. visitors learn best when involved in the learning process.

Their past experiences, and natural curiosity, must be taken into account when developing interpretive materials. The attracting and holding power of graphics which save on, and are more memorable than text, cannot be overemphasized. Effective communication reveals a site's story, preferably as part of an overall theme, through a unique ending or point of view.

Visitor behaviour and geological conservation

Interpretation seeks to present meaningful information and to elicit an appropriate response; a possible underpinning theoretical model is that of Ajzen & Fishbein (1980), relevantly employed (Taylor 1994) to analyse visitors to a botanical conservation exhibit. Essentially, visitors' actions can be explained, and the success of the communicated message assessed, by their:

- intention to perform the desired behaviour;
- attitude towards the desired behaviour;
- perception of the 'subjective norm' (pressure put on them to perform the desired behaviour);
- beliefs underlying the 'subjective norm' and their attitudes (behaviour leads to evaluated outcomes).

Behaviour indicative of a positive response to geological interpretation might include visitors' expressed support for and/or membership of conservation/geological bodies; equally it might stop the indiscriminate hammering of hard rock exposures and over collecting of specimens, so commonly reported by earth science conservationists, by geological field parties (Toghill 1972), and casual rockhounds:

> Beliefs underly a person's attitudes and subjective norms and ultimately determine intentions and behaviors. Behavioral change is ultimately the result of changes in beliefs. In order to influence behavior, people have to be exposed to information which will produces changes in their beliefs. (Taylor 1993).

Consequently, effective geological interpretive provision must present *information* at an appropriate visitor level; it must fire their

imagination, involve them, impart something of the fascination of the subject and indicate why *some* conservation is necessary. Purely descriptive provision, coupled with some prohibition notice, is probably highly ineffective. Several guidelines and reviews (Badman 1994; Page 1992; Page *et al.* 1996; Wray 1991) covering the selection of geological sites for conservation and the management of geology interpretive provision have been issued.

The visitor understood and understanding?

The surveys outlined

Noting that:

> Interpretation is a fascinating field. It involves a variety of media, a knowledge of the site resources and your visitors. One of the most challenging tasks is the analysis of visitors and applying visitor patterns and learning strategies to a specific site. (Miller 1990),

visitors to both coastal and inland interpreted geology sites have been surveyed by the author; the research has particularly focused on psychographic profiling of visitors and an assessment of their interaction with geology interpretive provision. Data from four sites with relevance to the theme of coastal protection and geological conservation are presented below. The sites typify both popular coastal and inland holiday locations, together with some evaluation of the resident populations of the source areas from which the visitors to the former are drawn. Also, the sites literally display a broad cross-section of current geology interpretive media styles and practices, together with a range of geological conservation issues. Hence, the analysis of the data from the various visitor surveys provides a basis for assessing the likely knowledge and understanding of, and attitudes to, geology and site conservation of visitors to coastal sites of geological significance.

Various methodologies were employed to gather the summative evaluation data presented in the appended figures and discussed within the text:

1. respondent-completed questionnaires;
2. structured interviews;

3. observation studies;
4. tracking studies;
5. photographic recording of interpretive materials and visitor behaviour.

The principal survey vehicles were questionnaires and interviews focused on adults and party leaders visiting the sites, since their knowledge, opinions and attitudes to geology are crucial to evaluating the success of the various geology interpretive schemes.

The sites

Hunstanton and Charmouth, as well as being popular with geologists, are much visited coastal recreational tourist sites. The low red and white Chalk cliffs of Hunstanton, Norfolk are interpreted by a single geology panel erected by English Nature in 1993 (Hose 1994b, Page 1994); additionally a photocopied information leaflet (Stevenson 1992) is available from the town's Tourist Information Centre. At Charmouth, Dorset the geology of the adjacent tall, highly unstable cliffs of fossil-packed Liassic dark shales, limestones and sandstones is explained by a geology interpretive panel and displays (including a 'hands on' centrepiece and a small audio-visual theatre) at the Heritage Coast Centre (Edmonds 1996); the area is very popular with both amateur and professional fossil collectors. Dudley and Ludlow are inland market centres. Dudley, West Midlands dominated by its Mediaeval castle perched upon an outcrop of Wenlock Limestone is distinctly industrial and urban in character; it has a number of tourist attractions, such as Dudley Zoo and The Black Country Museum, which are principally of interest to visitors from within the Birmingham conurbation. The Dudley Museum 'Time Trail' exhibition (Reid 1994) opened in November 1992; its main theme, explored through dioramas juxtaposed with large fossil-rich rock slabs, is the changing environments of the area (especially the internationally geologically significant Wren's Nest National Nature Reserve) over the past 400 million years. Ludlow, Shropshire with its Medieval castle and historic building core, is also built upon Wenlock Limestone, and is one of England's most perfect country towns (Cormack 1976); it is a popular venue for tourist

excursions from the English Midlands. Accessed, for an admission charge, via the tourist information centre, is the 'Reading the Rocks' exhibition; opened in 1995, this outlines the outstanding contribution of the nearby rocks and local/national geologists to the development of scientific geology in the nineteenth century. The area, with a sometimes detrimental impact upon sites (Toghill 1972), continues to be popular with geological field parties. Particularly noteworthy exhibits within 'Reading the Rocks' are a video microscope, a cartoon biography of the geologist Murchison, a diorama of early bony fishes and a display on the world's oldest known land animal – a predatory mite smaller than a pinhead!

The site surveys

At Hunstanton, on three successive Sundays in May 1994, over 10 hours, visitors who had viewed the panel for more than 30 seconds were interviewed. A log was kept over some 12 hours of visitors' response to the panel. Thirty-two visitors (80% response rate) were interviewed. At Charmouth, for six hours over three days in June 1994, visitors' response to the interpretive panels was logged. Additionally, over seven consecutive days in August 1994, 58 visitors were interviewed (90% response rate) as they exited the Centre. During August 1994 respondent-completed questionnaires were also issued from the Centre; 143 were returned. At Dudley, over four Saturdays in June/July 1995 52 (83% response rate) visitors exiting the 'Time Trail' exhibition were interviewed. At Ludlow, respondent-completed questionnaires were distributed within the exhibition space; 64 were returned during the period May to August 1995.

Outdoor interpretive panel usage

The Hunstanton panel's seemingly low (24%) response rate (Fig. 14.1) is actually, when compared with data from other sites (Bitgood *et al.* 1986), quite encouraging; its attracting and holding power rose as high tide approached, forcing people off the main sandy beach and onto either the promenade or the beach beneath the cliffs. The maximum recorded viewing time was 2.51 min and the mean was 1.02 min; one minute was judged to be the minimum viewing time required to assimilate the panel's data. The unseasonal

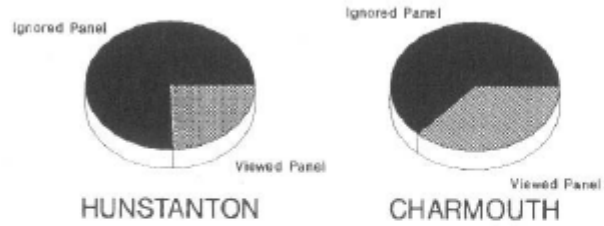

Fig. 14.1. Visitors response to information panels (coastal surveys).

inclement weather undoubtedly affected visitor behaviour towards the panel! At Charmouth, the interpretive panels' attracting (Fig. 14.1) and holding power *appeared* to be high. The maximum viewing time logged was 4.36 min and the mean was 1.04 min; it was greatest in the afternoon, when it was cooler, and at high tide. However, very few visitors actually read the geology interpretive panel; most were more interested in the adjacent panels on local wildlife and topography; consequently, interviews to assess its interpretive success were suspended. The interpretive success of the Hunstanton panel can be noted; 42% of respondents recalled the area was 'like the Bahamas' and 27% 'a warm, clear tropical sea' when the cliff's rocks were made. Some 53% of interviewees gave an accurate indication of the age of the rocks forming the cliffs. Clearly, the use of common terms and colourful word pictures was helpful to visitors. The clear warnings on cliff safety and geological conservation were ignored by many visitors at Charmouth.

General site survey findings

The generally similar visitor age profiles (Fig. 14.2) of Hunstanton/Ludlow and Dudley/Charmouth reflect the former's retiree base and the latter's attractiveness to those in mid life-cycle (with children). Consideration of the party size (Fig. 14.3) and visitation patterns (Fig. 14.4) of respondents and interviewees reinforces this conclusion – note the high proportion of couples at Hunstanton. The concentration of party sizes of three and four persons at Charmouth and Dudley is indicative of the attractiveness of these

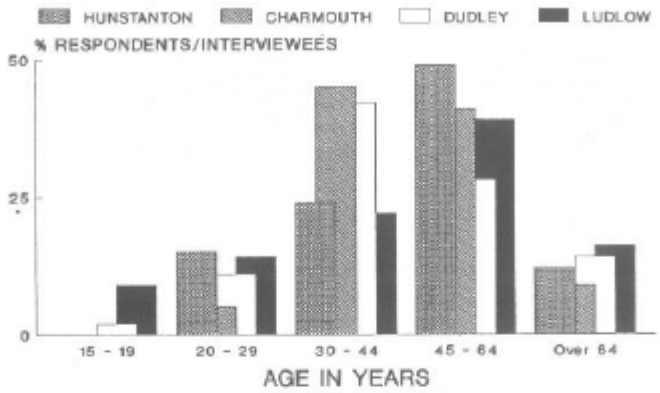

Fig. 14.2. Age profile of interviewees (inland and coastal surveys).

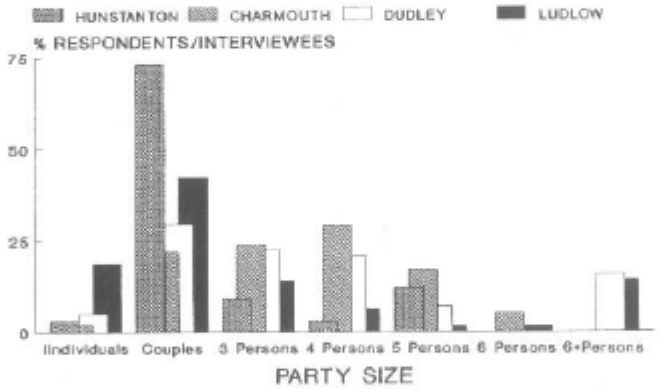

Fig. 14.3. Size of visitor parties to sites (inland and coastal surveys).

sites to families. At all of the sites, national newspaper readership (Fig. 14.5) was restricted to some 60% of respondents and interviewees. Interestingly, whilst Dudley and Hunstanton interviewees were tabloid inclined, Charmouth and Ludlow respondents had a comparatively high readership of broadsheets. Comparison with initial educational attainment levels (Fig. 14.6) suggests a clear

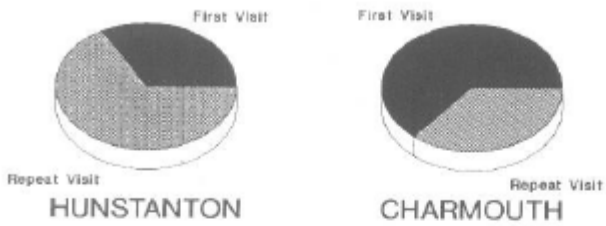

Fig. 14.4. Pattern of site visitation in the past 12 months (coastal surveys).

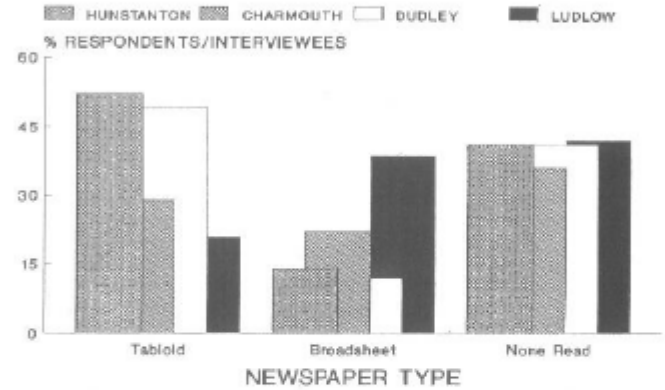

Fig. 14.5. National press readership of visitors (inland and coastal surveys)

correlation of high broadsheet readership (Fig. 14.5) with those who have completed higher education. The unexpectedly high reported 'A' Level initial study level at Dudley appears to be a recording error. The generally low level of initial educational attainment at Hunstanton probably reflects past regional employment trends, coupled with the mature age of many interviewees. The high level of tertiary education of Charmouth's respondents is noteworthy and is also reflected in the level of geological study.

The level of geological education (Fig. 14.7) is very low at all of the sites; however, at Charmouth, hobby geologists (at Miller's

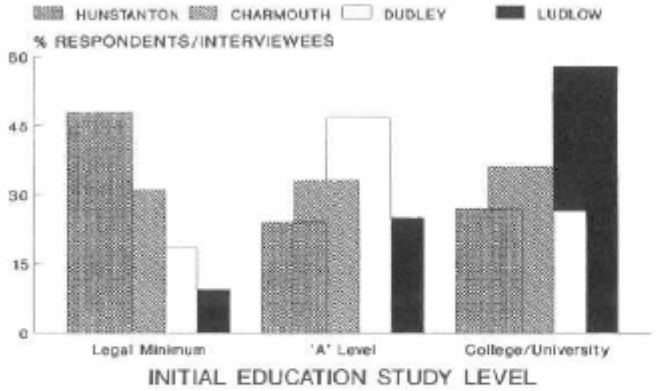

Fig. 14.6. Initial education study level of interviewees (inland and coastal surveys).

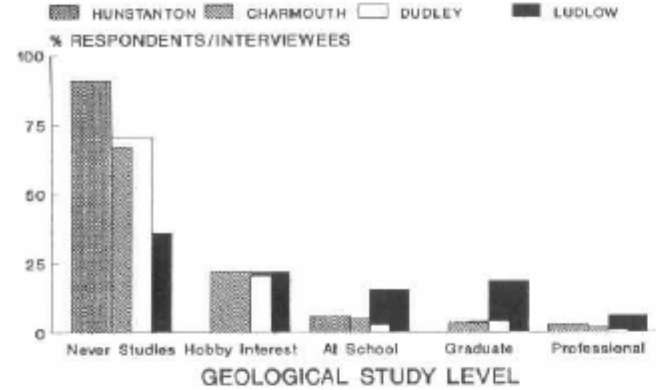

Fig. 14.7. Level of study of geology of visitors to the four sites (inland and coastal surveys).

Level Two) are clearly represented. Media hype, as much as genuine geological knowledge, clearly influenced interviewees' ability to name geological systems (Fig. 14.8); the release of the major film 'Jurassic Park' was contemporaneous with the surveys.

A third of Charmouth interviewees could name the Cretaceous system; very few of the Hunstanton interviewees could recall the

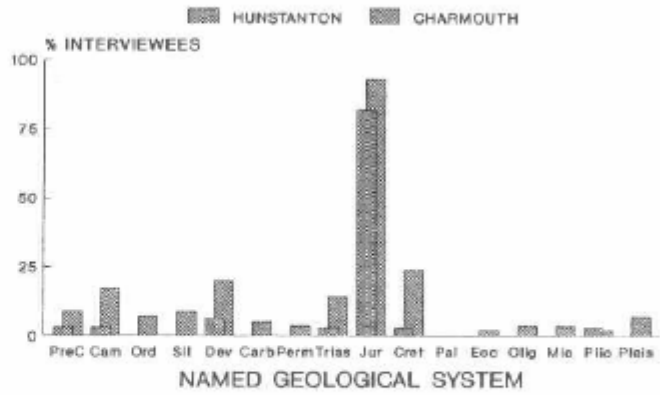

Fig. 14.8. Geological systems which were named by interviewees (coastal surveys).

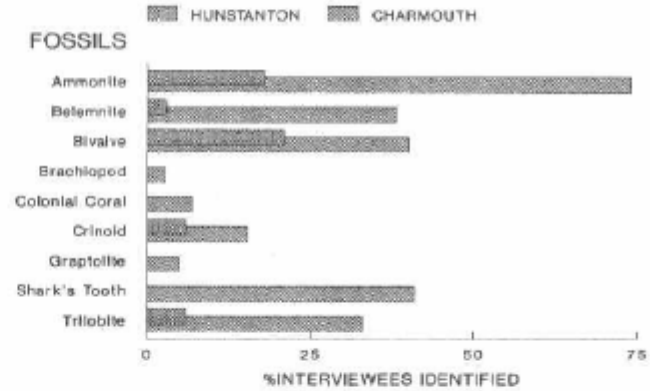

Fig. 14.9. Fossils recognized by interviewees (coastal surveys).

same system from the panel. Overall, interviewees had a very poor knowledge of basic stratigraphy. By comparison, recall and identification rates for fossils (Fig. 14.9), especially at Charmouth, were quite good. Ammonites, and bivalves were the most readily

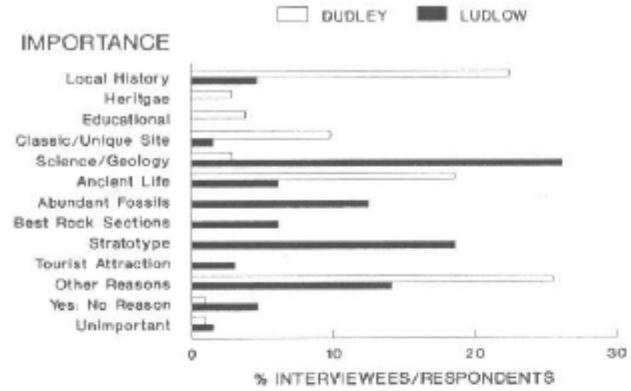

Fig. 14.10. Perceived importance of sites at exact locations (inland surveys).

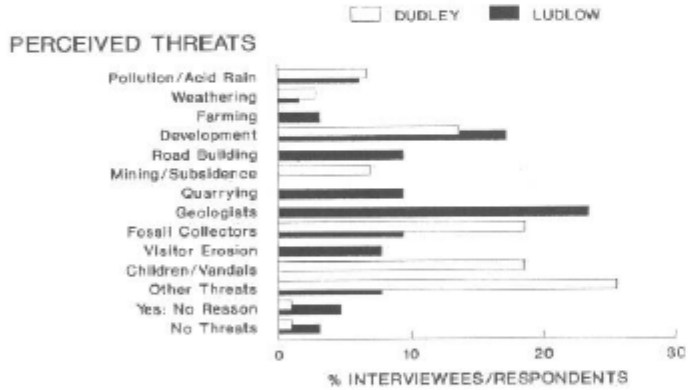

Fig. 14.11. Perceived threats to sites (inland sites).

recognized fossils. At Charmouth these, and belemnites, are the commonest fossils; over a third of its interviewees could identify most of the common fossil types. Hunstanton interviewees were probably disadvantaged by the general lack of local fossil-rich exposures; the ability of Hunstanton interviewees to identify the

fossil bivalve, similar to forms found living on the beach today, suggests that access to fossil displays might improve their recognition ability.

The museum surveys at the inland sites were especially designed to examine the knowledge and perceptions of the local geology of interviewees and respondents; only around a third had any real knowledge of the local important geology sites and their populist publications. Again, at both museums, one quarter or less acknowledged the important local fossils; a significant proportion expressed no real interest in them! Perceived site importance (Fig. 14.10) generally centred upon the concepts of heritage, local history and civic pride. Additionally, at Dudley 'ancient life' and at Ludlow 'importance to science/geology' and 'stratotype' were significant categories. Common perceived threats (Fig. 14.11) to the local geology were 'development' and the activities of fossil collectors and geology parties. 'Vandals and unruly children' were significant perceived threats for Dudley's urban interviewees. Ludlow respondents were also most concerned about 'road building' and 'quarrying'. The perceived threats of 'pollution and acid rain' at both sites is indicative that general environmental concerns are widespread if somewhat misunderstood!

Rockhounds considered

Geotourism retailing and marketing

Observation studies and responses to interview questions on the nature and pricing of geology retail goods indicate that inexpensive souvenirs, moderately-priced giftware, prepared fossils, mineral specimens and postcards are prime retail items; the latter's interpretive value is considerably underexploited. Geology leaflets, maps and books, whilst frequently examined by visitors, are marginal retail items. Clearly, populist geological literature could benefit from improvements in design and informational style and content; the tabloid readership levels (and consequently under 15 years of age reading ability) set clear limits to the vocabulary and style of such interpretive materials. Interestingly, many visitors expressed the view that leaflets should be free.

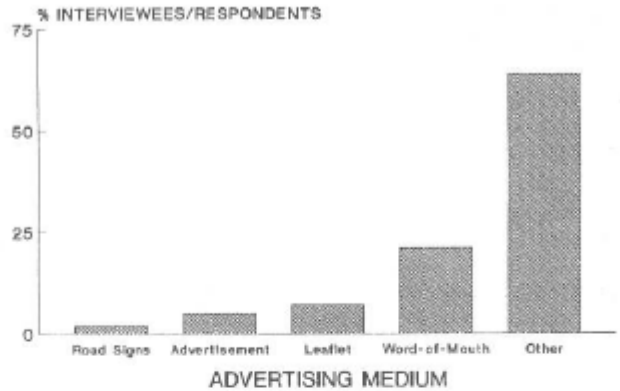

Fig. 14.12. Coastal Survey: source of first knowledge of site at Charmouth.

Conclusions

Despite some regional visitor base variation, general trends are evident. Overall, education levels were higher at specifically geological, compared with more general recreational, sites. Most visitors arrived in couples and small family groups; interviewees from the latter frequently expressed the view that the decision to visit had been prompted by the site's entertainment and educational potential for children. The sites held little attraction for those aged 15–29 years. 'Hands on' and 'live interpretation' (especially guided walks) are the most popular and enjoyable interpretive vehicles for visitors; the chance to converse with an 'expert', especially for those visitors with children, is much appreciated. Traditional displays and panels best attracted, held and informed visitors when bold graphics and simple, focused storylines were employed (Hose 1994a,b); some keen awareness of general and geologically specific conservation issues was apparent. Evidently, geological interpretive schemes can be visitor attractions in their own right, capable of providing enjoyable memorable experiences for visitors (Hose 1994b). However, as the Charmouth data (Fig. 14.12) indicate, their promotion and marketing could be considerably improved. Formal promotional items (advertisements and leaflets) were much less important than personal recommendation; most were only aware of the centre as they entered the car park! Given the international significance of the area's geology it is a sad reflection of both the site-specific and more general promotion of the UK's rich geological heritage. In closing, remembering the intent of geology interpretive schemes to both inform and influence visitors, Nicholas Steno, arguably the founder of scientific geology, writing in Renaissance Italy aptly concluded: 'What we see is beautiful, what we know is more beautiful, what we cannot grasp, most beautiful'.

Acknowledgements

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Coastal Defence and Earth Science Conservation

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Tremendous changes in attitude, policy and practice in relation to coastal defences have taken place in Britain over the last ten years. However, considerable conflicts between the interests of coastal protection and those of conservation remain. This book examines the needs of both and explores methods and strategies that may be used to achieve a compromise or produce sustainable decisions.

Coastal Defence and Earth Science Conservation has contributions from engineers and conservationists and is principally written by practitioners within the field. The intended audience includes engineers and planners involved in coastal and shoreline management, and conservationists in both national and local agencies.

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