

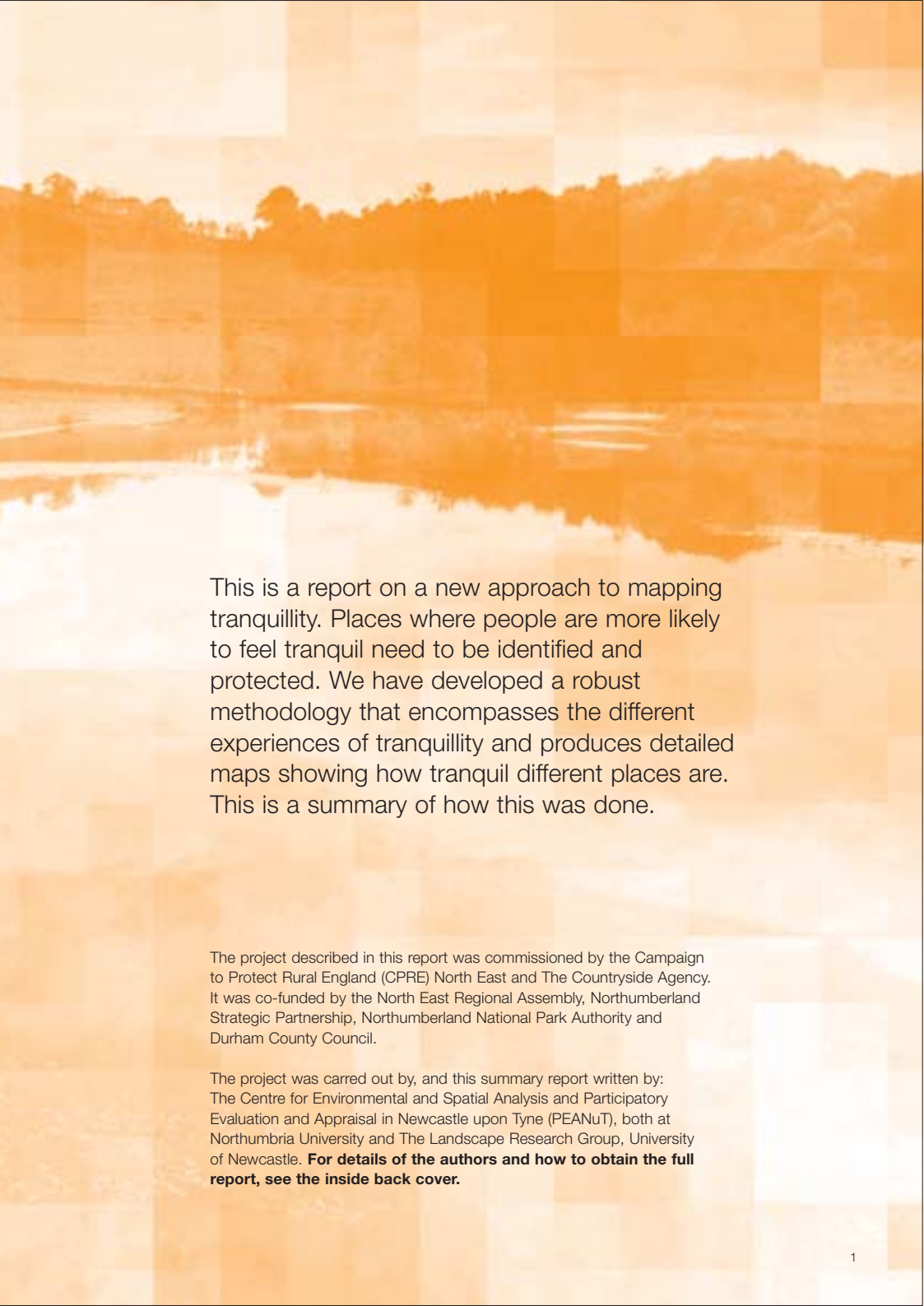


# Mapping Tranquillity

Defining and assessing  
a valuable resource

	Executive summary	3
1	What is tranquillity?	10
2	Mapping tranquillity – ideas and innovations	15
3	Assessing people's experience – using Participatory Appraisal	22
4	The meanings of tranquillity – findings from Participatory Appraisal	27
5	Mapping people's opinions	30
6	Putting it all together	45
	Endnotes	56
	Contact details	

Front cover: Hadrian's Wall,  
Northumberland National Park.  
Inside cover: Walltown,  
Northumberland National Park.



This is a report on a new approach to mapping tranquillity. Places where people are more likely to feel tranquil need to be identified and protected. We have developed a robust methodology that encompasses the different experiences of tranquillity and produces detailed maps showing how tranquil different places are. This is a summary of how this was done.

The project described in this report was commissioned by the Campaign to Protect Rural England (CPRE) North East and The Countryside Agency. It was co-funded by the North East Regional Assembly, Northumberland Strategic Partnership, Northumberland National Park Authority and Durham County Council.

The project was carried out by, and this summary report written by: The Centre for Environmental and Spatial Analysis and Participatory Evaluation and Appraisal in Newcastle upon Tyne (PEANuT), both at Northumbria University and The Landscape Research Group, University of Newcastle. **For details of the authors and how to obtain the full report, see the inside back cover.**





something worth  
protecting...

## Executive summary

The word ‘tranquillity’ appears in a great many policy and planning documents, and also numerous publications which promote places for tourism and inward investment. It is clear that whatever tranquillity is, and wherever it is to be found, it is important and judged to be worth protecting.

Previous psychological research<sup>1</sup> has highlighted why tranquillity is important. Being in tranquil places allows people to relax, to escape from the stresses and strains of everyday life and to ‘recharge their batteries’. However, tranquillity remains relatively poorly understood as a concept. Tranquillity is seen as an indicator of environmental quality, but most environmental indicators focus on tangible, quantifiable attributes such as the length of hedgerows, water quality or the accessibility of green space. Qualitative, experiential aspects of landscape are far harder to account for. Tranquillity runs the risk of being overlooked because of this perceived difficulty.

This research was commissioned to develop a methodology that was robust and could support a range of activities, with land-use and landscape planning foremost amongst them. It has established that a qualitative consultation of a wide range of countryside users and other groups can be accommodated within a quantitative framework for analysis and mapping, thereby drawing tranquillity into the range of available countryside quality indicators.

### Method: assessing and mapping relative tranquillity

Tranquillity mapping is not a new concept. It was first developed by Simon Rendel of ASH Consulting for a Department of Transport study in 1991. The original study led to the production of a set of Tranquil Area maps covering England, produced by Rendel and ASH Consulting, and published by the Campaign to Protect Rural England (CPRE) and the former Countryside Commission (1995).

In these maps, 'Tranquil Areas' were defined as: 'places which are sufficiently far away from the visual or noise intrusion of development or traffic to be considered unspoilt by urban influences'.<sup>2</sup> These places were identified through specific criteria, with Tranquil Areas being found certain distances away from features such as roads, towns, airports and power stations.

We have built on this body of work. More sophisticated mapping techniques are now available, and we have used extensive public consultation as the basis for the maps. This means that the maps produced by our research are not an update of the original maps because the methodology is not directly comparable. However, our work significantly advances our appreciation of what comprises tranquillity, what detracts from it, and how to identify tranquil areas within a given region. The methodology developed here differs from the previous work on tranquillity mapping in four key ways:

- **Rather than starting with an 'expert' definition of what compromises tranquillity, we have started with extensive public and stakeholder consultation to define what factors contribute to and detract from tranquillity;**
- **Previous work has focused exclusively on factors that detract from tranquillity. Our approach includes factors that contribute to, as well as detract from tranquillity;**
- **We use the term 'relative tranquillity' to describe what we are mapping. Relatively tranquil areas are those which have higher scores for the positive factors, and lower scores for the negative factors, than other areas. Our maps reveal areas, both large and small, where people are likely to experience tranquillity. But they do not include sharp lines dividing tranquil from non-tranquil areas; and**
- **Our approach incorporates more advanced modelling techniques to look at the diffusion of these factors' impact over distance. This has allowed us to produce detailed surface maps which give every place a tranquillity score rather than crude zones of tranquil/non tranquil, or high/medium/low tranquillity.**

In 2000, a detailed critique of the original CPRE maps was published.<sup>3</sup> It argued that what was needed was a measure of tranquillity that included all, and only, those sources of disturbance which people feel actually damage tranquillity; and which weighted them in proportion to peoples' perceptions of their relative impacts on tranquillity. This is exactly what we have done.

### What is tranquillity?

- Perceived links to 'nature'
- Positive features in the landscape
- The importance of wildlife
- Peace, quiet and calm



### What is not tranquillity?

- Disruptive behaviour of other people
- Noise, especially from cars
- Overt signs of human development – negative features in the landscape



Above: Countryside near Medomsley in the West Durham Coalfield and traffic on the A167(M), Newcastle.

### Assessing people's experiences: using Participatory Appraisal

Our new maps were drawn on the basis of what tranquillity means to people, why it is important, and where it is to be found. To do this, we carried out 'Participatory Appraisal' (PA) with people in two pilot study areas in North East England: the Northumberland National Park and the West Durham Coalfield in County Durham. PA is a method of understanding people's values and beliefs. It enables them to discuss what is important to them in their own words. In this research, PA involved groups of key local stakeholders in both study areas and people at countryside access points. The table below shows our 'headline findings' from PA about what contributes to and detracts from tranquillity.

Positive factors	Weight
Openness of the landscape	24%
Perceived naturalness of the landscape	30%
Rivers in the landscape	21%
Areas of low noise	20%
Visibility of the sea	6%
Total of positive factors	100%
Positive Scores as a percentage of the overall scores	44%

Negative factors	Weight
Presence of other people	60%
Visibility of roads	12%
General signs of overt human impact	10%
Visibility of urban development	8%
Road, train and urban area noise	7%
Night time light pollution	3%
Aircraft noise	1.5%
Military training noise	<1%
Total of negative factors	100%
Negative Scores as a percentage of the overall scores	56%

Modelling using GIS

The maps in this research were produced using a Geographical Information System (GIS), a computer-based system for the integration, analysis, modelling and mapping of geographically referenced datasets. The linkage between the PA results and the GIS model in this research was twofold.

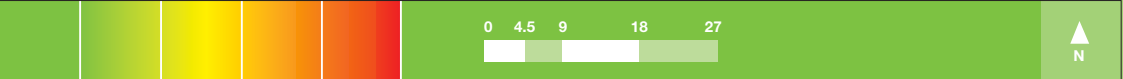
- 1 The PA results identified what kinds of issues were important to people. These issues were then associated with nationally-available datasets to represent the different dimensions of tranquillity.
- 2 The PA results identified the relative significance of these issues. This allowed the datasets to be differentially weighted in the analysis, to give the maps of relative tranquillity.

The table above summarises the results from PA and how they informed the GIS model. There has been some aggregation of the categories for the sake of clarity in this summary. The weight figure describes the relative significance of each factor, as determined from the consultation responses.

Figure 1 (right):  
Composite maps of  
relative tranquillity for  
the two study areas







Relatively  
most tranquil

Relatively  
least tranquil

Kilometres

Northumberland  
National Park



West Durham Coalfield



We divided the range of positive and negative factors which emerged from PA into three key contributors to, or detractors from, tranquillity: landscape, people and noise. To draw up our maps, we divided all of the two study areas into squares measuring 250 metres x 250 metres and gave each square scores, both positive and negative, for landscape, people and noise.

**Landscape:** things that could be seen, both attractive and unattractive, from each individual 250 m x 250 m square in the study areas were identified. Thus the amount of exposure to visual elements in the landscape both positive (for example views of wide open countryside, the sea or broadleaved woodland) and negative (for example views of pylons) was combined with the perceived naturalness of each individual grid square and the presence of rivers to score each individual square. Included in this was modelled overhead 'skyglow' or light pollution.

**People:** in the consultation, 'people' were associated with many kinds of behaviours (e.g. loud noise, litter, barking dogs and noisy children) and in some cases the very presence of any people detracted from tranquillity. A modelling approach that identified the relative likelihood of a visitor encountering other people in a given square was then used to calculate scores that are essentially a measure of remoteness from other people.

**Noise:** there are no available maps of noise so GIS techniques were used to model the diffusion of noise away from sources such as roads, urban areas, railways and military training. For each 250 m x 250 m square a value of maximum noise at any time and a value for the average noise exposure over time was calculated.

Through a process of weighting, based on the PA results, and combining these different factors, the final maps of relative tranquillity were developed: see Figure 1.

### Relative tranquillity

Our mapping produces a spectrum of more or less tranquil areas, determined by the combined positive and negative scores given to each grid square. Our maps therefore identify areas that have more or fewer of the important characteristics that were associated with tranquillity in the Participatory Appraisal results. We do not identify absolutely tranquil areas; drawing a line on a map and stating that the area inside is tranquil and the area outside is not. This would fail to reflect the fact that many environmental qualities, such as tranquillity, vary over space and time and do not exist within neatly defined and geographically limited areas.

We use the term 'relative tranquillity' to describe what we are mapping. Each square's score can be compared – or related – to the scores of all the other squares in the area, or areas, being mapped. The more tranquil areas highlighted by the mapping are those which are more likely to provide countryside users with the space and conditions to relax, achieve mental balance and a sense of distance from stress. These relatively tranquil areas are characterised by a low density of people, minimal levels of artificial noise and a landscape that is perceived as relatively natural, with few overt signs of human influence.

In the case of our two study areas, the accessibility of the countryside of the West Durham Coalfield, its high population density and closeness to settlements drive down its tranquillity score. Not surprisingly, it appears from our maps to be much less tranquil than the Northumberland National Park. But this should not, we argue, be taken to say anything about the value of such areas within their local context; something does not have to be nationally rare to be locally valuable, it just has to be valued by local people. We suggest a way in which our maps could be used to highlight the most tranquil and valued places within more densely populated and built up areas.

**Tranquillity is a useful concept and one that can be used as a workable indicator of countryside quality.**

Walkers in  
Northumberland  
National Park.



## Conclusions

This research set out to develop a methodology that was robust and that also had the potential to support a range of activities, particularly land-use and landscape planning and environmental impact assessment. Our approach meets both of these requirements and addresses the criticisms that have been made of previous tranquillity mapping. It is founded in broad-based consultation of countryside users as well as stakeholder groups. This breadth of consultation is as critical to the robustness of the methodology as are the PA to GIS connections and the GIS techniques. We have shown that tranquillity is a useful concept and one that can be used as a workable indicator of countryside quality.

While tranquillity may be a personal experience, there are places where it is more likely to be experienced. Although the concept currently merits a mention in a variety of documents, policies and reviews, unless the experiential or 'felt' aspects of landscape are considered alongside more easily quantified and indicated characteristics, landscape, countryside and environmental quality can only be partially safeguarded into the future.

## 1 What is ‘tranquillity’?

Tranquillity is known to be important but it is difficult to define. Somerset Maugham thought that evenings were particularly tranquil.

For listeners to BBC Radio 4 it was encapsulated in certain sounds such as waves or wind through trees.<sup>1</sup> Two thousand years ago the Roman orator and statesman Cicero thought it was essential for a happy life.

Clearly, tranquillity means different things to different people. Our approach has been based around the need to explore and represent this diversity of opinion, through examination of what tranquillity means to people, where they go to experience it and why it is important to them. We have used these responses to develop a robust and workable methodology because we have shown that while tranquillity may seem to be a highly subjective experience, certain factors emerge strongly and repetitively. This allows us to build a picture of what characterises and detracts from tranquil areas, or areas that enable people to find tranquillity.

This research shows that tranquillity is a vital element of people's experience of the countryside, one that can be used as a workable indicator, and that it has significance that resonates across different places, times, and groups of people. Moreover, the methodology developed allows ‘tranquillity’ to be a useful concept, of practical value in decision making.



difficult to define...  
essential for a  
happy life



### Why tranquillity is important

It is clear that whatever tranquillity is, and wherever it is to be found, it is important. A Government survey (2004)<sup>5</sup> found that the most commonly mentioned reason (by 58% of people) for visiting the countryside was for tranquillity. Similar research in the North East (2003)<sup>6</sup> asked people to select their three top reasons for visiting Northumberland National Park. Tranquillity was the most popular response.

It is also clear that tranquillity needs to be protected. For example, in the environmental report commissioned by the East of England Regional Assembly to examine the effect of building half a million new houses in that region, the consultants Levett-Therivel stated: 'The plan is likely to have serious negative impacts on water resources, biodiversity, tranquillity, air quality, recreational access and congestion'.<sup>7</sup>

The Government's Regional Planning Guidance for the North East of England<sup>8</sup> states: 'Tranquillity is an important part of countryside character', and that Development Plans and other strategies should:

- **Identify those areas where the maintenance of tranquillity is both important and practical; and**
- **Protect and, where appropriate, increase tranquil areas throughout the region when formulating policies for land-use, transport and traffic management' (Government Office North East, 2002).**

Tranquillity is therefore seen as an asset and a benefit to an area and the people in it, and something that should be preserved and enhanced. The concept is also drawn on in the media, marketing, and a wide range of publicity material. Indeed, the latest version of the Northumberland National Park website promises visitors to Kielder Water and Forest Park 'pure tranquillity in a truly stunning environment'.<sup>9</sup>

Most environmental indicators, however, focus on tangible, quantifiable attributes such as the length of hedgerows, water quality or the



### **'A healthy and attractive countryside brings social benefits such as tranquillity'**

(Statement by Rt Hon Margaret Beckett, Secretary of State for Environment, Food and Rural Affairs, on *The Rural Strategy 2004* to the House of Commons, 21 July 2004)

physical accessibility of green space. Qualitative, experiential aspects of landscape are far harder to account for in quantitative terms, so environmental characteristics such as tranquillity risk being overlooked because of this perceived difficulty. This research has established that qualitative consultation of a wide range of countryside users and stakeholders can be accommodated within a quantitative framework for analysis and mapping, thereby including tranquillity in the range of countryside quality indicators. Our work also permits patterns of change over time in tranquillity to be accounted for.

### Why tranquillity matters to people

Previous psychological research<sup>10</sup> has highlighted why tranquillity is important. Being in tranquil places allows people to relax, to escape from the stresses and strains of everyday life and to recover from mental fatigue. These environments are distinct from the everyday environment; they allow us to become infused with fresh energy. Further research has found that it is the interaction between the person and their environment that is important – it is therefore the experience of being in places that have specific characteristics that is the important consideration here.<sup>11</sup>

A recent review of over 100 studies<sup>12</sup> found convincing evidence of the importance of the natural environment in facilitating recovery from stress. It highlighted that the primary reasons for visiting natural environments included escape from the stress of urban areas and the attainment of tranquillity and solitude. Furthermore, Government sponsored research<sup>13</sup> points out that the benefits of viewing green-space or other nature goes beyond aesthetic enjoyment to include enhanced emotional well-being, reduced stress, and, in certain situations, improved health.

It is therefore crucial to understand more about tranquillity, and to assess those places where people can find that experience.

**‘Climb the mountains and get their good tidings. Nature’s peace will flow into you as sunshine flows into the trees. The winds blow their freshness into you and the storms their energy, while cares drop off you like autumn leaves.’**

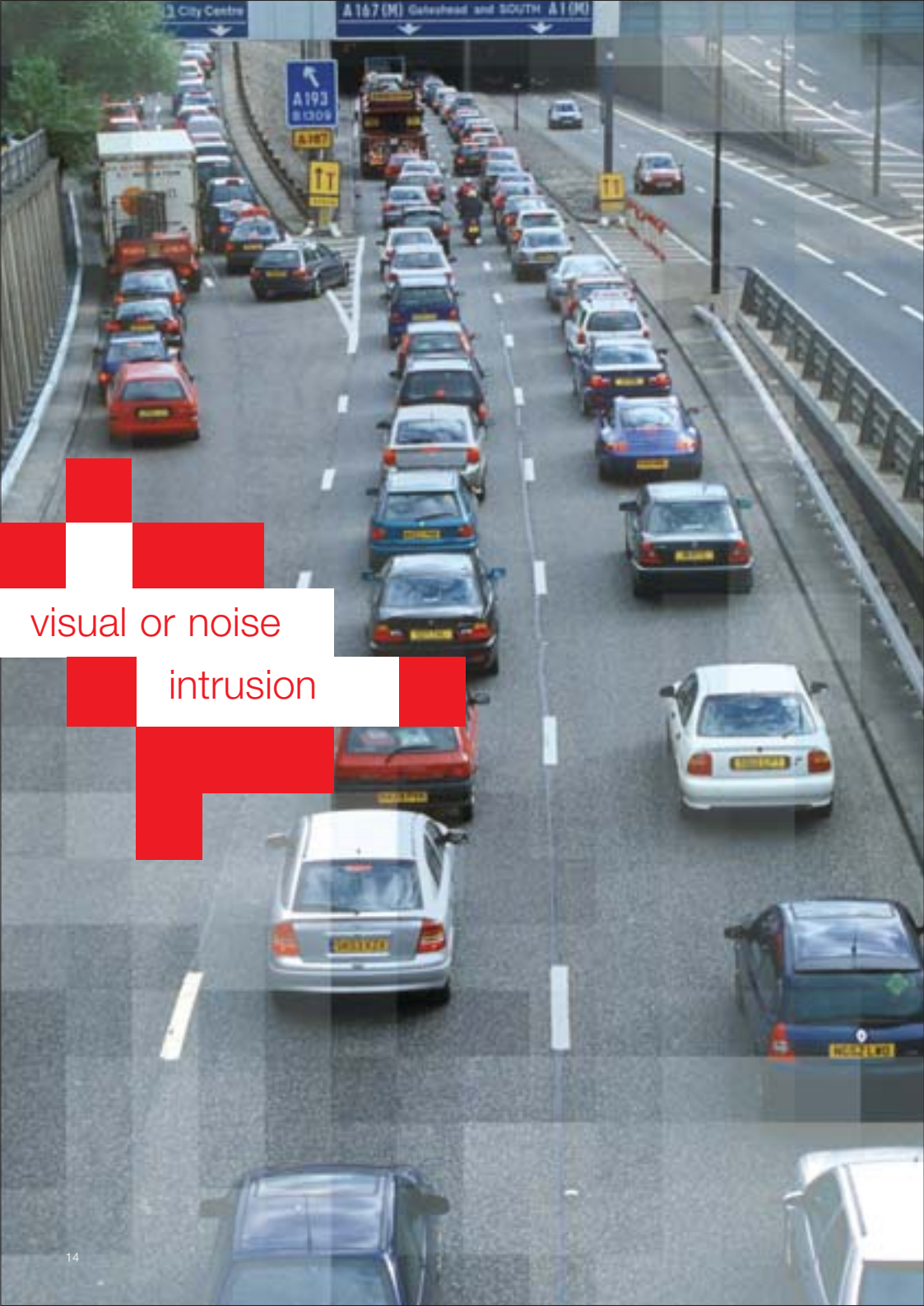
John Muir



Above left: Family group in Northumberland National Park.  
Above right: The Derwent Valley in the West Durham Coalfield.

**‘The countryside provides many benefits. It is valued for its wildlife, landscape and cultural heritage and also tranquillity. Increasingly, many enjoy a better quality of life living in the countryside.’**

*The Rural Strategy 2004, DEFRA.*



visual or noise  
intrusion

## 2 Mapping tranquillity: ideas and innovations

Mapping tranquillity is not a new concept. It was first developed by Simon Rendel of ASH Consulting for a Department of Transport study in 1991, which examined the effect of a new transport corridor in Hertfordshire and Bedfordshire.

The work was devised because although much of the countryside around the proposed road scheme was designated for landscape quality, significant tracts remained undesignated and were therefore vulnerable to development. The decision was made to map all of this undisturbed countryside as a resource in itself.

This original study led to the production of a set of tranquil area maps covering all of England, produced by Rendel and ASH Consulting, and published by the Campaign to Protect Rural England (CPRE) and the former Countryside Commission, now the Countryside Agency, in 1995. In these maps, 'tranquil areas' were defined as: **'places which are sufficiently far away from the visual or noise intrusion of development or traffic to be considered unspoilt by urban influences'**<sup>14</sup>

Such places were determined by the researchers by calculating the distances from various features perceived to be disruptive, and it was decided that a tranquil area lay:

- **More than 4 km from the largest power stations;**
- **More than 3 km from the most highly trafficked roads such as the M1/M6; from large towns (the size of Leicester and larger); and from major industrial areas;**
- **More than 2 km from most other motorways and major trunk roads such as the M4 and A1, and from the edge of smaller towns;**
- **More than 1 km from medium disturbance roads, i.e. roads which are difficult to cross in peak hours (taken to be roughly equivalent to greater than 10,000 vehicles per day), and some main line railways; and**
- **Beyond military and civil airfield/airport noise lozenges as defined by published noise data (where available) and beyond very extensive opencast mining.**

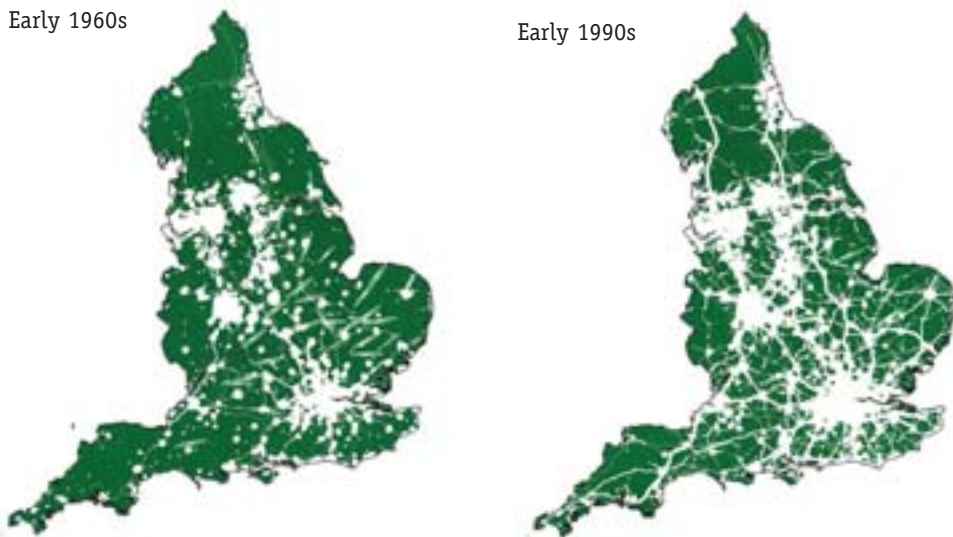
These criteria produced the following maps (Figure 2 overleaf), which show tranquil areas (defined in the terms above) in the early 1960s and the early 1990s.

Kilometres

Tranquil  
areasTranquil areas  
with some  
intrusion /  
disturbanceNon-tranquil  
areas (white)

Early 1960s

Early 1990s

**Figure 2:**

CPRE /Countryside Commission  
tranquillity maps of 1995

These maps show that tranquil areas, as defined in these terms, have reduced in extent over this time period. This work was ground breaking, establishing the feasibility of tranquillity mapping, and the need to document changes in tranquil areas. A set of regional maps were also published, using the same data sets but different scales, allowing for comparisons between regions as well as over time. These CPRE and Countryside Commission maps have been used in many strategic documents, despite criticisms of the methodology which will be discussed shortly, because they capture the essence of the concept that people can relate to quickly. These mapping techniques were also applied to Wales<sup>15</sup>, and to areas of Scotland.<sup>16</sup> Subsequent work also introduced other criteria to be included in the maps, such as a recreational facilities, and their effect on increasing traffic, noise and visual pollution, and additional car parks.<sup>17</sup>



In 1997, ASH Consulting were commissioned to apply the same general approach to the Sussex Downs Area of Outstanding Natural Beauty,<sup>18</sup> but at a more detailed level of resolution, nominally at a 1:50,000 scale. Conceptually, this project treated tranquillity, remoteness and disturbance as heavily overlapping concepts, and relied on 'expert' judgements for both the selection of input criteria and their relative significance. This was consistent with previous work up until that point. Significantly however, and reflecting this more detailed approach, the impact of woodland and topography were also considered in respect of the perception of tranquillity, alongside the attenuation of noise over long distances.

In our study, we have built on this body of work. More sophisticated mapping techniques are now available, and we have used extensive public consultation as the basis for our maps. This means our maps are not an updated version of the original tranquil maps because the methodology is not directly comparable. We are using different mapping techniques, different data, and the principles upon which the maps are drawn differ. However, our work significantly advances our appreciation of what comprises tranquillity, what detracts from it, and how to identify tranquil areas within a given region.

Our methodology establishes the ability for changes in tranquillity to be identified and mapped over time, as well as identifying the more and less tranquil areas within a given study area, whether this is at the national, regional or local scale.

Below: Non-tranquil area –  
A1 west of Newcastle.



### A new approach

The conceptualisation of tranquillity mapping, and its development over the last decade, was novel, hugely influential, and demonstrated the value of such a concept. This work takes a significant step forward in developing a methodology and an underpinning definition of tranquillity. It differs from the previous work on tranquillity mapping in four key ways.

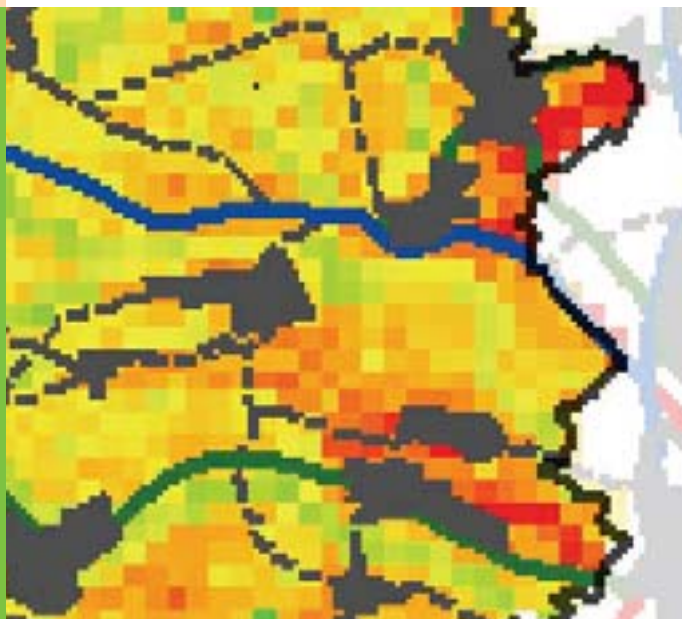
- Rather than starting with an ‘expert’ definition of what comprises tranquillity, we derived the definition from extensive consultation. In previous research, the researchers defined the criteria that would be used, and then applied the modelling and mapping from that point. This failed to accommodate the likelihood that a wider cross section of the population might have different, or divergent views.
- Previous work focused exclusively on factors that detract from tranquillity, such as roads and airports. Our approach includes positive factors that contribute to, as well as negative factors that detract from tranquillity. For us, the glass is not just half empty, but subject to forces that both fill and drain it. We weight both these positive and negative factors according to how important people think they are in determining how tranquil a place is.
- In this research we have developed a conceptual framework of relative tranquillity. Relatively tranquil areas are those which have higher scores for the positive factors, and lower scores for the negative factors, than other areas. Our maps reveal areas, both large and small, where people are likely to experience tranquillity. But they do not identify absolutely tranquil areas, nor do they produce sharp lines dividing tranquil from non-tranquil areas. Relative tranquillity is something that is context dependent. For instance the most tranquil areas within Tyne and Wear would still be judged relatively untranquil if considered alongside Northumberland National Park and the North Pennines. This point about ‘relative’ tranquillity is critical, and will be addressed more fully at the end of this report.
- More advanced modelling techniques allow us to map the diffusion of variables’ impact over space. For example, noise levels decrease with distance from sources such as roads, but this is mediated by other factors such as vegetation and terrain and we have been able to take into account some of these effects. We have therefore been able to produce continuous surface maps of relative tranquillity, rather than zones of tranquil/non tranquil, or high/medium/low tranquillity.

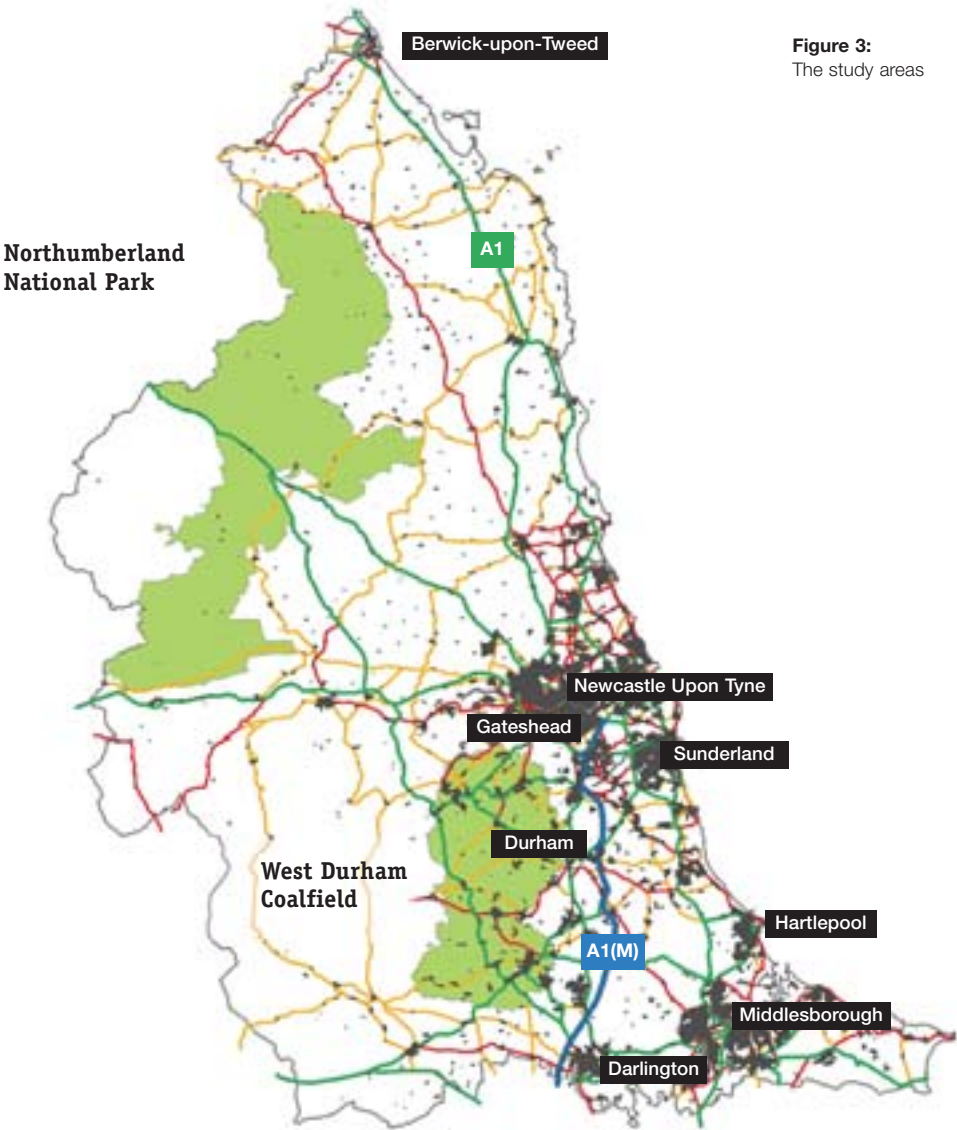
Below right: Detail from  
West Durham Coalfield  
map showing 250m x  
250m grid squares.

The sophisticated mapping techniques used in this project have allowed us to take account of varying conditions, notably topography and vegetation. We have included the cumulative effects of factors that add to or detract from tranquillity, and the interaction between factors. It has also been possible to incorporate local effects, excluded from the 1995 CPRE/Countryside Commission maps. Indeed, we show the importance of areas that have many of the characteristics of tranquillity that are in close proximity to centres of population, and are therefore of considerable value in their local context. We have also opened up the mapping process; factors were included that arose as important during the consultation. In this summary report and the main report, we discuss in detail how decisions about what to map were made.

In 2000, a detailed critique of the original CPRE/Countryside Commission maps was published.<sup>19</sup> This critique argued that a measure of tranquillity was needed that included all, and only, sources of disturbance which people felt actually damaged tranquillity; and which weighted them in proportion to people's perceptions of their relative impacts on tranquillity. This is exactly what we have done.

**This work takes  
a significant  
step forward in  
developing a  
methodology and  
an underpinning  
definition of  
tranquillity.**





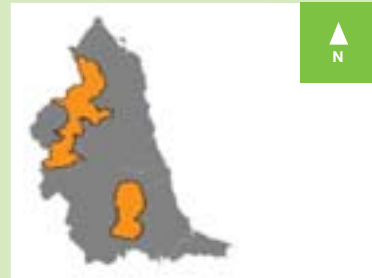
**Figure 3:**  
The study areas

### Study areas

This research was carried out in two pilot study areas in North East England, the Northumberland National Park, and the West Durham Coalfield in County Durham (Figure 3). The consultation work was conducted in both areas, and the results collated so that the same factors were taken into account for both. Maps of relative tranquillity have been produced for both areas. The study areas were to a large degree determined before the start of this research through the inclusion of the Northumberland National Park Authority and Durham County Council as project sponsors.

The Northumberland National Park is England and Wales' least visited national park and in recent years has been promoted as a place which offers solitude, wildness and high landscape quality.

It is sparsely populated and not severely fragmented by transport corridors, although few areas are more than 5 km from any road. The Northumberland National Park broadly breaks down into the Cheviot Hills to the north, the Simonside Hills to the east, the Upper Tyne Valley leading up to Kielder Water and Forest in the west and the Hadrian's Wall World Heritage Site in the south. Extensive areas are managed by the Forestry Commission.



Location of the two study areas in North East England.

One of the most historically contentious aspects of the national park is the dominance of the Ministry of Defence Otterburn Training Area, located in its central reaches. There has been military training here for over 90 years, but recent developments to facilitate training using more sophisticated and powerful weapons, especially self-propelled artillery and rocket systems, have highlighted what is at times an uncomfortable relationship between the Ministry of Defence, the Northumberland National Park Authority, local residents and countryside users.

The West Durham Coalfield study area is much smaller than the national park but is far more densely populated and dissected by numerous roads and a railway. Many of the settlements are of a significant population size, for instance Bishop Auckland (~25,000), Consett (~25,000) and Stanley (~29,000). Much of the area thus exhibits typical characteristics of an urban fringe environment, with intense levels of pressure on a limited space. It is a relatively deprived former coalfield area, although land reclamation has usually been to a high standard. Access to the countryside is generally good, with a dense network of rights of way and different types of woodland distributed through the area. To the east of the West Durham Coalfield the land falls away to the densely populated coastal plain and the City of Durham itself. To the west it rises quite sharply to the North Pennines and the density of population and related infrastructure declines.



### 3 Assessing people's experiences: using Participatory Appraisal

Our tranquillity maps are based on an in-depth exploration of what tranquillity means to people, why it is considered to be important, and where it is perceived to be found.



This exploration was based around the use of 'participatory appraisal' (PA).<sup>20</sup> This is an approach to consultation focused on exploring people's perceptions, values and beliefs, and designed to allow participants to express these in their own words. Non-directive questions are used to encourage people to discuss their attitudes in ways that do not impose external opinions on them. Participants are encouraged to think through and express what is important to them, in whatever way they want to. PA treats everyone who is consulted as an 'expert' in the situation – as people

who 'know how things really are' – and allows their voices to be heard. It is important to appreciate, however, that PA is understood and applied in different ways by different practitioners, and that the approach adopted here is that espoused by the Participatory Evaluation and Appraisal in Newcastle-upon-Tyne (PEANuT) project at Northumbria University.

Above: A participant's sketch of a tranquil area.  
Right: Cyclists in Northumberland National Park.



what tranquillity

means to people

#### Participatory appraisal – questions, tools and techniques

The main questions explored during the PA consultation were as follows:

##### What is 'tranquillity'?

- What makes an area 'tranquil'?
- What does 'tranquillity' mean to you?
- If an area were described as being 'tranquil', what features would it have?
- Where are 'tranquil' areas you know of?

##### What factors cause 'tranquillity'?

- What makes an area more 'tranquil'?
- What makes an area less 'tranquil'?

##### What impacts do 'tranquil' areas have?

- When you are in what you consider to be a 'tranquil' area, how do you feel?

##### What does a 'tranquil' area look like?

##### Do places become more/less 'tranquil' over time?

(day/night, weeks, months, seasons, years...)

With PA, emphasis is placed on the use of tools and techniques which are highly visual. This enables all members of the community to participate at a level of their choosing. For each of these questions, therefore, a range of tools was identified as potentially being the most fruitful for generating discussion.

These included:

- **Spider diagrams** – where people draw diagrams of ideas that are related to each other;
- **'Graffiti walls/boards'** – where people can 'brainstorm' and write any ideas (usually on post-it notes) that they have about tranquillity on the board;
- **Visual representations** – asking people to draw a picture of a (real or imagined) tranquil place, and to annotate their picture(s) with further details if necessary;
- **Mapping** – asking people to mark on maps where tranquil places are, and to add details of what makes that place tranquil in their opinion;
- **Bean voting** – where people comment on the ideas on the graffiti board and vote for the ones they agree with;
- **Circle diagrams** – consisting of a number of concentric circles equal to the number of responses, with each participant moving a response one step closer to the centre circle if it is felt to be important; and
- Unstructured interviews.

Top: Notes on the 'graffiti board'.  
Above: Participants record their ideas at a PA session.

In PA research, data reliability is constantly checked and verified through triangulation (by using different 'tools and techniques' to ask the same question), with all information being carefully and systematically recorded so that comparisons can be made throughout the process.

In this research, PA was undertaken in both study areas with groups of key local stakeholders and countryside users. The stakeholders groups includes representatives from local government, heritage, tourism and conservation organisations, and environmental groups. PA sessions were also carried out with people at 14 countryside access points (visitor centres and car parks for visitor attractions or recreational areas). At these, the team set up a stand and invited people visiting those areas to take part in the research. Including these two different 'types' of participant provided a broader response than would have been achieved by simply exploring the concept with members of relevant professional bodies. Over 400 people were consulted at the countryside access points, with a further 30 at the stakeholder sessions.

### Verifying the results

A key part of the PA research underpinning our maps was the verification of the initial PA findings. Two public events were held to achieve this. They provided an opportunity for research respondents to verify or 'check' the provisional research findings. They also provided an opportunity for a wider/larger group of people to participate in the research. The original respondents and others were invited to view and comment upon both their own ideas and the ideas of others. They were asked if they agreed with them, had anything to add, wanted to challenge any of them, or make suggestions.

The two verification events, one in each study area, were based on responses to the notion of tranquillity gathered during the previous fieldwork sessions. Before the events, the responses made during the various PA sessions were collated into themes according to whether they were something 'you see', 'you hear', 'you do' in a tranquil area, or whether they were 'of the mind', something 'you do not see' or 'you do not hear'.

These collated responses were presented to participants at the two verification events. They were then asked to choose their top three responses within each theme or sense-based category, according to their perceived level of importance to tranquillity. Participants were also able to provide additional specific responses if their own perceptions differed from the statements given. Over one hundred people attended the two events.

The verification events largely confirmed the primary themes apparent in the main research, and suggested that there is considerable agreement amongst the respondents concerning core perceptions of what tranquillity is and is not.

For example, some responses received a greater than equal share of participants' votes: the top 5% of the responses received 23% of the votes cast. There were 382 different responses, and 16 of them received more than 50 votes, with 366 scoring fewer. The more commonly chosen responses tended to be those of a more general nature, with the 'tail' being comprised of a range of more specific responses.







being amongst nature

...wind through leaves



## 4 The meanings of tranquillity – findings from Participatory Appraisal

This chapter sets out the key themes that arose from the field work and the verification events.

### What is tranquillity?

#### Perceived links to 'nature' and 'natural' features

A large proportion and a wide range of the responses made during the research linked tranquillity to hearing, seeing and/or experiencing various aspects of perceived 'nature'. They noted the importance of 'being among nature' (which received strong support at verification), and:

**'nothing, just nature'; 'natural countryside'; 'natural places'; 'close to nature'**

These links to 'nature' had aural and visual aspects. Aurally, respondents noted the specific importance of 'natural sounds', which received the second highest verification score. Participants suggested that 'hearing wildlife' was important, and 'wind through leaves' was also a popular response.

#### Features in the landscape

For many people, experiencing 'the landscape', a 'natural landscape', or elements of it, was a key component of tranquillity, with a wide range of related aspects being suggested. Some respondents focused on general, or large scale features, suggesting 'beautiful scenery' and 'wild landscapes'. Others focused on elements of a 'rolling countryside' as being key to their perceptions of tranquillity and tranquil places, while some picked out a range of additional landscape 'types' or key characteristics, such as fields, glades, and moors. For others, the responses focused on smaller scale features, such as 'beautiful flora and fauna'.

**Tranquil places... 'have a different rhythm to urban life'**



The importance of 'water' and related aspects was emphasised by many respondents. The 'sound of water, rivers, waves' was the highest ranked response at verification. 'The sea' was strongly supported at verification as something you hear in a tranquil place and as something you see in a tranquil place.

Many respondents focused on greenery, noting the importance of 'natural colours' and 'plenty of greenery'. Linked to this, participants described the role of 'woodlands', 'deciduous trees not firs', and the 'movement of trees'.

Others focused on the importance of views, far horizons, and open landscape. Respondents described the importance of space, remoteness, and 'lots of space for people to spread out'. Within notions of 'landscape', respondents also commented on more human-related aspects, suggesting tranquil places would be safe and well maintained.

### **The importance of wildlife**

Aspects of 'wildlife' were perceived by many respondents to be very important to their notions of tranquility, with 'the sight of wildlife behaving naturally' receiving strong support at verification. Specific animals and birds were mentioned, as well as a general category of 'wildlife' and the ability to be close to it. In particular, people commented on the positive effects of 'hearing bird song'.

### **Peace, quiet and calm – tranquillity of the mind**

Tranquility was also considered to be extremely important by many respondents for a range of personal or internal reasons – many of which were well supported at verification. Responses emphasised that it was necessary to 'restore personal balance', 'to de-stress' and that tranquility was a 'feeling of well being'.

Over and over again, people told us that tranquility is about peace, calm and quietness, incorporating the notion of peace as an absence of noise, and about being 'at peace'. As one respondent argued, 'it's a place where you feel at peace i.e. a 'feeling' rather than absolute peace'; another described it as a 'state of mind when in nice surroundings'. Others equated tranquility with 'getting away from it all' (well-supported at verification) 'feeling like miles away from anywhere', and that tranquil places are 'areas you can visit to leave all your troubles behind – escape life's hustle and bustle'. The importance of 'solitude' in having a tranquil experience was also noted.

### **Doing things**

Finally, many respondents identified particular activities that added to their experience of tranquility. Of these, a particular focus emerged around 'walking' (widely supported at verification) – 'somewhere you have to walk to but when you get there, the rewards are tremendous' was how one respondent described it. A range of other activities was also suggested. 'Things I enjoy with friends and family', and 'enjoying the landscape' both received firm support during the verification process.

**Tranquillity is...  
'being sat on a  
mountain top  
looking down on  
traffic and the  
world going about  
its business'**





## What is not tranquillity? '76 hikers in bright cagoules'

### What is not tranquillity?

Many of the responses to questions about what tranquillity is focused either on natural factors and characteristics associated with tranquil places, or how such places made them feel. But a large majority of the responses to the question 'what is not tranquillity?' (as well as some responses to being asked 'what is tranquillity?') focused on the impact of humans in a variety of forms.

At a general level, it was the mere presence of humans that detracted from tranquillity for many respondents, particularly 'too many' people. Certain types of behaviour and activities undertaken by people were considered as detracting from tranquillity, much of which revolved around the issue of unwanted noise and disturbance (both seen and heard). At verification 'mobile phones' was an extremely popular response, as were 'ghetto blasters/radios' and 'noisy people'. Participants commented on the negative impacts of people 'not respecting an area', such as 'drunken teenagers', and 'loutish behaviour'. These comments also included reference to rubbish and litter.

The negative impacts of various forms of transport and vehicles were commented upon by a number of respondents, with 'traffic' receiving strong support at verification as being something not seen in a tranquil place. Car noise was repeatedly identified as something you do not hear in a tranquil place. Motorbikes, quad bikes, aeroplanes and military aircraft were also often mentioned.

A more general form of negative impact concerned various forms of 'development' in the landscape, particularly any that was perceived to be 'too commercialised' or made 'industrial sounds'.

Above right: Notes from a Participatory Appraisal session.  
Above: A participant makes her contribution.

## 5 Mapping people's opinions

The PA research gave a wealth of responses that permitted us to define tranquillity in terms of factors that contribute to and detract from it.

This enabled our mapping of tranquillity to be based on widespread consultation, rather than a relatively narrow, 'expert'-based view. It ultimately provided information that could be grouped under the following headings:

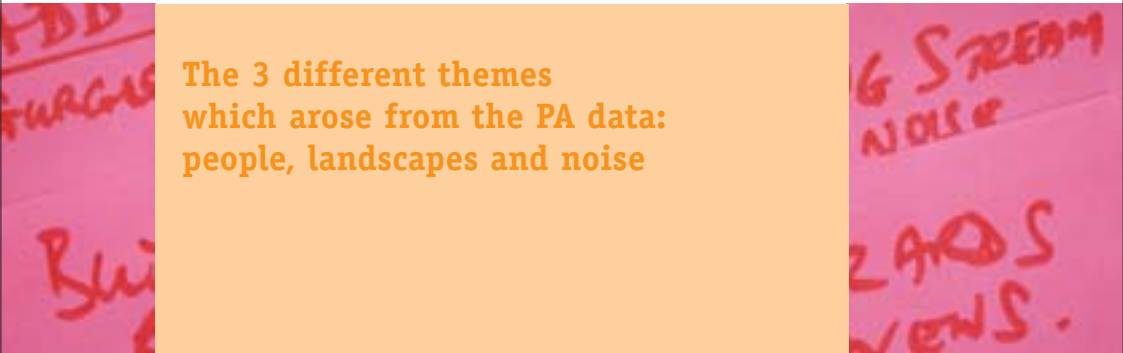
- **Whether tranquillity is important;**
- **Why tranquillity is important;**
- **What state of mind and experiences tranquillity is associated with;**
- **What activities tranquillity is most associated with;**
- **What visual things contribute to tranquillity;**
- **What visual things damage or detract from tranquillity;**
- **What noises contribute to tranquillity; and**
- **What noises damage or detract from tranquillity.**

The consultation data was then linked with mapping techniques to produce tranquillity maps for the two study areas.



a wealth of  
responses

We used a Geographical Information System (GIS) to derive maps from the PA data. This is a computer-based system for the integration, analysis, and mapping of geographically referenced datasets. All the relevant information is fed into the GIS to produce a 'model': a method of 'representing a complex state of affairs by reducing it to something simpler which embodies as many as possible of what the modeller sees as its most important characteristics'.<sup>21</sup> All GIS models are driven by the data sets that are included, the operations that are performed on them, and the parameters that are set for those operations. In this research, decisions about what these 'important characteristics' are has been determined, as far as possible, by the PA and not by us as 'modellers'.



### The 3 different themes which arose from the PA data: people, landscapes and noise

The PA data were very varied and extremely qualitative, and this necessarily meant that we had to make some judgements about how to group and categorise responses, in order for them to inform the mapping process. Our response to the need to make some judgements about how best to 'operationalise' the data is to be transparent – setting out exactly what we did, thereby permitting a debate about the methods that we adopted, and the decisions that we took. This is again in contrast to previous work that has been 'expert' driven. We are opening up the processes of our research and not assuming that we have all the answers.

Our decisions about how to interpret the data and apply them to the GIS model were based on consultation with the project steering group and published best practice. The linkage between the PA results and the GIS model was twofold.

**1** The PA results identified what issues were important to people, and these issues were then associated with nationally available datasets such as land cover (vegetation), terrain, urban areas and other human infrastructure to represent the different dimensions of tranquillity.

**2** The PA results identified the relative significance of these issues. This allowed

the datasets to be differentially weighted in the analysis, which then enabled us to draw maps of relative tranquillity. 'Expert' decisions about what to include and what relative weightings to allocate have been kept to an absolute minimum. The results of the PA work were used to define the parameters of the model wherever possible.



Positive factors	Weight
Openness of the landscape	24%
Perceived naturalness of the landscape	30%
Rivers in the landscape	21%
Areas of low noise	20%
Visibility of the sea	6%
Total of positive factors	100%
<b>Positive Scores as a percentage of the overall scores</b>	<b>44%</b>

Negative factors	Weight
Presence of other people	60%
Visibility of roads	12%
General signs of overt human impact	10%
Visibility of urban development	8%
Road, train and urban area noise	7%
Night time light pollution	3%
Aircraft noise	1.5%
Military training noise	<1%
Total of negative factors	100%
<b>Negative Scores as a percentage of the overall scores</b>	<b>56%</b>

The two tables above summarise the PA information as used to inform the GIS model. There has been some aggregation of the categories for the sake of clarity in this summary report; please consult the main report for the full description. In essence, the positive and negative factors – things that add to or detract from tranquillity – were separated. The weight percentages describe the relative significance of the PA responses for each factor when compared to the other positive or negative factors with which it is grouped. The weights within the positive and negative factors therefore each total 100%.

The bottom rows of the two tables indicate the relative balance of all the positive and negative datasets when they are combined. The proportion of the total responses that were positive and negative were 44% and 56% respectively. One way of simplifying this is to say that people appear to be slightly more aware of, or concerned about, the factors that damage the experience of tranquillity rather than the factors that create tranquillity.

These data were then organised around three categories. These categories were directly developed from the PA data, and were envisaged as useful conceptual categories for the various elements from the data. The categories, ranked in terms of their significance, are:

- **People and tranquillity;**
- **Landscape and tranquillity; and**
- **Noise and tranquillity.**



### The framework for mapping

To be able to map tranquillity, a geographical framework was required. For the GIS model, this was a grid made up of a large number of cells, or squares, each of which measured 250 metres by 250 metres. All calculations relating to people, landscape and noise were carried out for each one of these squares, to assess the relative tranquillity within each of them. The next stage of the work was to link the results to datasets that could be used in the model. This is elaborated in the main report, but in summary GIS techniques were used to model the variables as follows.

**People:** in the consultation 'people' were associated with many kinds of behaviours (e.g. loud noise, litter, barking dogs and noisy children) and in some cases the very presence of any people detracted from tranquillity. A modelling approach that identified the relative likelihood of people being in a given square was used to calculate scores that are essentially a measure of remoteness from other people.

**Landscape:** things that could be seen (both attractive and unattractive) from and within each individual square in each of the study areas, were identified. Thus the relative amount of visual exposure to sights both positive (for example rivers, wide open views, the sea or broadleaved woodland) and negative (for example pylons, industry, or light pollution) were combined with the perceived naturalness of each individual square and the presence of rivers to score each individual square.

**Noise:** there are no available maps of noise so GIS techniques were used to model the diffusion of noise away from sources such as roads, urban areas, railways and military training areas. For each 250 m x 250 m grid square the maximum noise at any time and time-averaged noise exposure was estimated. This was done to take into account the effect of intermittent but very loud noise and low but constant 'background' noise on the experience of tranquillity.

## Positive factors: 'Openness of the landscape'

### 'Other' responses

Some of the responses from the PA results did not readily fit into our three categories concerning people, landscape and noise. The categories do not, in themselves, deal with the range of feelings people have about tranquillity or the importance they attach to it. The previous tranquillity mapping work was criticised for not taking such values – that are not directly mappable – into account. In our research, the responses that we received establish the importance of the concept of tranquillity, and the use of PA techniques means that information about people's perceptions of tranquillity can be presented alongside the maps.

Moreover, while tranquillity may be a deeply personal and complex experience, there are clearly types of places where it is more likely to be experienced. This was summed up by one respondent who said that tranquillity is a 'state of mind when in nice surroundings'. Another described tranquil places as 'areas you can visit to leave all your troubles behind – escape life's hustle and bustle'. Our maps show places where the probability of being in the right 'state of mind' to have a tranquil experience is maximised.

In the rest of this report, we will document how we modelled each of the three categories and show the maps that the modelling produced.

### Remoteness from people

Ultimately, people are the source of almost all the factors that detract from tranquillity, or the potential to achieve tranquillity.

The term 'remoteness' is not one that was heavily used by respondents in the PA session. But what they did say was that other people – and the things they do and are associated with – detract from tranquillity and that an absence of others added to tranquillity. The sorts of responses that people gave did not lend themselves to being related to specific data sets that could be used in the model. For example, respondents stated that rubbish, 'ghetto blasters', people on mobile phones, dog dirt, plastic bags and vandalism all detracted from tranquillity. We judged that what these responses had in common was that the perceived nuisance was likely to increase with the number of people in view, earshot, and proximity. While this is an assumption and will not capture the specific nature of all of the responses, we have calculated the probability of seeing, hearing, or being in close proximity to other people in different parts of the study areas as a measure of how 'other people and the things they do' detract from tranquillity.

Above left: Countryside  
near Burnopfield, West  
Durham Coalfield.

## Building a model of remoteness

Working from the assumption that people-related nuisance declines with a reduction in the concentration of people, the model was designed to calculate the probability of people being present in any part of the study area. The results are therefore expressed as a graded level of likelihood of being close to other people. They also excluded people working on the land, consistent with the PA results.

To calculate the probability of people being present, two elements of data are required.

- 1 The 'source' from which the diffusion of people is to start; for example, a car park in the national park. This may be a concentrated source of people, who will then spread out in different directions.**

The following were defined as 'sources' of people:

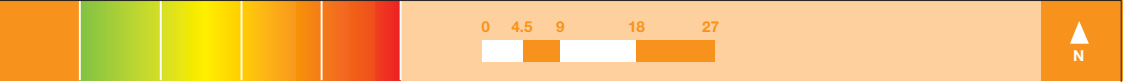
- Urban areas;
- Buildings outside of urban areas;
- Roads; and
- 'Honeypot' sites, comprising: car parks; caravan and camping sites, picnic sites and visitor centres

- 2 The relative 'friction' of the landscape over which the movement of people is to be calculated. Friction refers to the ease of travel. For example, private, enclosed land was allocated a high frictional value in the model. Open access areas and linear countryside routes were allocated lower levels. Areas of woodland, even where access through forest rides is facilitated, were allocated a relatively high frictional value to represent the relatively high ability for woodlands to 'absorb' visitors, compared to open countryside.**

To model the effect of these two factors, every square with a 'source' of people in it was identified, and the 'friction' of leaving it and travelling in other directions was calculated.

Each of the sources listed above has a different likelihood of distributing people into the countryside. For example, a large urban town is likely to distribute more people than a car park in a remote rural area. So we weighted the sources of people differently, making judgements about the relative significance of these different sources and drawing on data such as the Office for National Statistics' population figures for different urban areas in order to do so. These judgements can be debated and refined and possibly improved by actual observation. However, this was outside the remit of this particular study.

The outcome of our 'remoteness from people' model was to assign each 250m x 250m square one of six different levels of probability for a visitor encountering other people, ranging from most to least likely. The resulting plot of the impact of people on tranquillity across the two study areas is shown on the maps in Figure 4.



Relatively  
low impact

Relatively  
high impact

Kilometres

Northumberland  
National Park



West Durham Coalfield



**Figure 4:**

The impact of people  
on tranquillity

## Landscape and tranquillity

Landscape is a broad term, used here to capture a range of visual factors that were judged to have either a positive or a negative effect on the experience of tranquillity.

The PA results under this heading were highly diverse. The overall category was broken down into a number of factors and associated with a series of datasets which were then used to structure this component of the GIS model.

### The PA results

There was a wide range of responses in the PA results. People talked about 'greenery', 'babbling brooks', and 'lots of trees' as adding to tranquillity, and 'over management', 'pylons' and 'high rise buildings' as detracting from it.

From the responses we were able to define several key characteristics:

- **The perceived naturalness of the landscape within each square, or the visitor's immediate surroundings (modelled using the type of landcover in each square);**
- **The presence and visibility of rivers (those squares that contained or had a view of a river were weighted higher than those that did not);**
- **The presence and visibility of woodland, both coniferous (negative) and broadleaved/mixed species (positive);**
- **Few overt signs of human interference (the relative visibility of features perceived as relatively natural or unnatural from each of the grid squares);**
- **Openness of the landscape: the ability to see 'the long view' (the relative visibility of all squares out to a limit of 35 km from each of the grid squares); and**
- **Light pollution (modelled overhead skyglow, as distinct from skyglow at the horizon).**

We incorporated these responses to landscape in our mapping as follows.

## 1 Mapping landcover

The Landcover Survey 2000 dataset from the Centre for Ecology and Hydrology divides the whole of England's surface into small squares and assigns each of these to one of 27 different categories of landcover. We gave each of these landcover types a score for perceived naturalness from 1 to 6. Our scoring system was based on the PA data, but because a direct quantitative basis for scoring was not available from the PA results we devised the system by referring to the literature and using our professional judgement. Broad-leaved woodland and bog were judged to have the highest level of perceived naturalness, which then descended through grassland, improved pasture, arable land and coniferous forest to urbanised areas. We gave higher scores to the landcover types perceived to be more natural and lower scores to those perceived to be less natural.

What is in a square is important, but so are the squares around it. We therefore took account of the relative naturalness of the surrounding landscape as well. The score for each of the eight squares surrounding every square was also calculated. This highlights larger areas within the landscape with similar scores of perceived naturalness (both high and low).

## 2 Mapping visibility of negative features

The PA results highlighted that the visibility of perceived non-natural features in the landscape detracted from tranquillity. The non-natural features identified in the PA were:

- **Roads: motorways, primary roads, A roads, B roads, and minor roads**
- **Caravan parks**
- **Railways**
- **Quarries**
- **Urban areas**
- **Vertical structures such as pylons and telecommunications masts**
- **Isolated properties**
- **Windfarms**

The visibility of each of these features within the landscape was calculated for each individual square using a digital terrain model of the north of England.

The key variables were:

- **The terrain model itself, which determined intervisibility between points;**
- **Subject height – the height of the object being observed (e.g. 45 m for power pylons);**
- **Viewing height – the height of the person observing – an average of 1.85 m is used for this;**
- **The distance limit beyond which visibility is no longer calculated, termed the Zone of Theoretical Visibility (ZTV), which is different for objects of different height (for instance the ZTV for 45 m tall power pylons is 15 km and it is 6 km for railways); and**
- **A distance-related scoring system which means that an object which could be seen and was close was considered as more significant than the same object at a greater distance.**





### 3 Mapping presence and visibility of rivers and the sea

Water emerged from the PA results as being a significant landscape element associated very positively with tranquillity. This encompassed being able to see and hear rivers, doing things near them such as walking or picnicking and the ability to see the sea, whether over a long distance or in closer proximity. To account for hearing flowing water and activities near rivers and streams, all squares containing a river or stream were allocated a positive score. To represent the visibility of rivers, a distance weighted calculation allocated higher scores to squares which were close to rivers and from which rivers could be seen. To represent visibility of the North Sea, a distance weighted calculation allocated higher scores to squares which were close to the sea and from which the sea could be seen.

### 4 Modelling openness

Our PA survey found that the openness of the landscape, and environmental characteristics that were judged to be captured by this term, were strongly associated with the experience of tranquillity. Respondents talked about rolling countryside, lots of space and distant mountains. We classified these responses as being related to openness. But of course this is a double-edged characteristic; the ability to view a wide area is more likely, all other things being equal, to include views of features such as roads, urban areas and power lines, which detract from tranquillity.

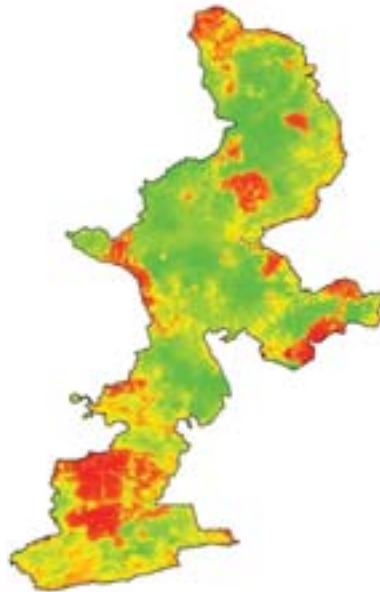
Technically, the foundations of modelling openness are very similar to those described in the previous section, relating to the visibility of specific features. Openness is calculated in essentially the same way but instead of the question being 'How many relatively non-natural features can be seen from this square?', the question is 'How many other grid squares can be seen from this one?'. This process was applied for each grid square within the study areas. The result gives a measure to each individual grid square of how much land can be seen from it, equating to openness of the landscape it is set in.

### 5 Modelling skyglow

Large quantities of artificial light spilt upwards and sideways from the ground are reflected off tiny particles of dust and water droplets, causing the sky over and around urban areas to glow at night. Across large areas of the UK this skyglow is strong enough to obscure the great majority of stars otherwise visible to the naked eye.

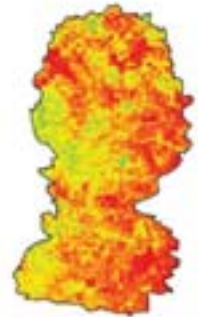
CPRE has published a report on the problem including simple light pollution maps based on satellite data,<sup>22</sup> but existing methodological research on quantifying overhead skyglow is limited. Albers and Duriscoe (2001)<sup>23</sup> quantitatively define skyglow as a function of distance from urban areas and size of urban area. The research underpinning this is drawn from the USA where cities are much larger and the population density of rural areas is generally far lower than in the UK. No account is taken of sparsely distributed light sources because skyglow results from the cumulative effects of major concentrations of light sources. Seeing isolated lights or concentrations of lights in the distance may detract from people's experience of otherwise tranquil areas, but only overhead skyglow was considered in this report. This type of light pollution emerged from the PA data as being of limited significance as a factor detracting from the tranquillity of landscape.

Thus, in total, five different sets of calculations concerned with different aspects of landscape and tranquillity were carried out for each grid square. Figures 5 and 6 are maps for two of these aspects of landscape: the perceived naturalness of landcover, and evidence of overt human development or activity on the landscape respectively.



Northumberland  
National Park

West Durham Coalfield

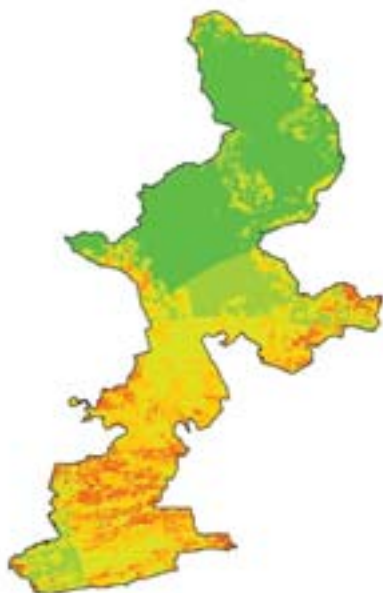


**Figure 5:**  
Perceived naturalness  
of landcover

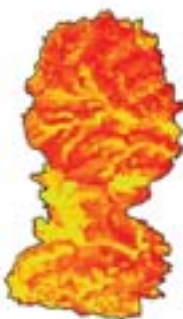
Few overt signs of  
human impact

Overt signs of  
human impact

Northumberland  
National Park



West Durham Coalfield



**Figure 6:**  
Evidence of overt  
human development  
or activity on the  
landscape

## Modelling the impact of noise

### Tranquillity is... 'silence so that you can hear natural sounds'

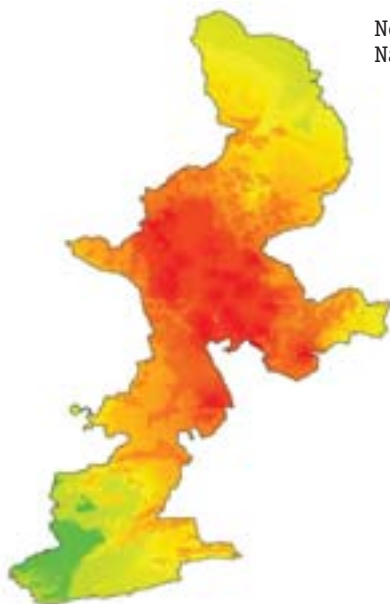
This quote from one of the PA sessions came to represent one of the variables that people most valued when they identified a tranquil area: not necessarily absolute silence but something different from the urban experience, somewhere with an opportunity to hear non-human sounds that would be drowned out, or unavailable, where most people spend most of their lives.

Noise as a term is used to define unwanted sound and as such it depends upon human perception. The selection of what sounds constitute noise was made on the basis of the PA data. From this, the noise sources that were identified as being most significant in detracting from tranquillity were:

- Road noise;
- Aircraft noise;
- Urban noise;
- Military training; and
- Other human associated noise such as explosions or railways.

After identifying these key sources from the PA data, the noise levels at source were identified from a wide review of the literature. For example, at source, traffic on A roads measures on average 70 decibels and explosions 180 decibels.

However, noise is not simply about the level at source but the diffusion of that noise over a distance. Noise diffusion, or the rate of attenuation away from its source, is a complex function of several variables, many of which are not constant. One important consideration is whether sound can travel in a straight line from the noise source to the person hearing it rather than having to go over an obstacle such as a hill. Accounting for this in a GIS model is relatively straightforward. However, accounting for the effect of wind on noise attenuation, for example, is extremely complex.

Lowest  
potential noiseHighest  
potential noiseNorthumberland  
National Park

## West Durham Coalfield



**Figure 7:**  
Map of the maximum  
potential noise

No model, however carefully constructed, finely grained or tightly calibrated can hope to accommodate the full range of acoustic, atmospheric, environmental and human variables. What we have done in this research is to take account of the significant variables that affect noise attenuation from the range of sources that were identified as important in the PA research. Following the accepted procedures in the literature<sup>24</sup>, our model has taken account of attenuation of noise resulting from:

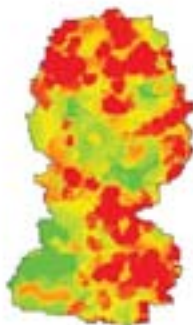
- Geometrical divergence over distance;
- Air absorption;
- Absorption by the ground; and
- Other effects including reflection from surfaces, foliage and buildings.

We applied the formulae in the literature modelling how noise diffuses under different conditions of terrain, weather and vegetation, to determine the level of noise that could be expected in each of the grid squares. This took into account the noise sources within each square and the noises that could be heard from surrounding squares. These calculations gave us the maximum potential decibel level that might be experienced in each square, illustrated in Figure 7.

We also needed to differentiate between these maximum levels of noise and cumulative exposure to noise over time, or 'time-weighted noise exposure'. For instance, artillery firing is extremely loud, but when taken over a period of a year, relatively infrequent. A busy road by contrast is much less noisy in absolute volume terms, but exposure to that noise level is constant for those within earshot through all of the day and much of the night. Our methodology needed to deal with both the absolute loudness of a relevant source of noise and how much of the time it was being heard. Furthermore, any attempt to produce a single, composite map of relative tranquillity ought to take into account that the overall noise 'picture' will change as time passes – at weekends there are more motorbikes in

Lowest noise  
exposureHighest noise  
exposureNorthumberland  
National Park

## West Durham Coalfield

**Figure 8:**Map of the time  
weighted noise exposure

the Northumberland National Park but usually no artillery firing, whilst late at night the West Durham Coalfield is quieter because there is much less road traffic.

Therefore, to take account of time-weighted noise exposure, we made calculations on the basis of the temporal regularity of each noise source – the percentage of time when each noise can be heard between 7 am and 7 pm. A noise that was constant between these times would therefore have a 100% regularity rating. In this study, we drew on the existing data to determine that main roads generate noise 90% of the time, while for military explosions, this is less than 2%. These calculations therefore take account of both the level of a noise and the likelihood of a person hearing it at any one time.

We judged the time-weighted exposure to noise map to be a better reflection of the impact of noise on the experience of tranquillity than the maximum noise map. We have included both maps here (see Figures 7 and 8).

Aircraft noise was a relatively minor element of the GIS model, reflecting its fairly low ranking in the PA results. However, it was not possible to differentiate between different parts of the study areas on the basis of the relative intensity of overflights. Commercial aircraft tend to be restricted to high altitude flight over the Northumberland National Park and West Durham Coalfield and as such their noise contribution is low volume and diffuse over a wide area, although low-flying private aircraft, glider towing aircraft, helicopters and microlights are present and subject to some local concentrations. Low-flying military aircraft cause a much louder 'burst' or 'spike' of noise. Although the Ministry of Defence and Defence Estates cooperated with this study, no geographically disaggregated data on military low-flying was available, in contrast to ground-based training at Otterburn which was set out in some detail.





contributing to or  
detracting from the  
experience of tranquillity



## 6 Putting it all together

So far, we have described the modelling of the three different themes that arose from the PA data – remoteness from people, landscapes and noise. To produce overall maps of relative tranquillity, these were combined.

There were five stages in putting together the final, appropriately weighted GIS model:

- 1 The PA data were associated with a specific map-based dataset where possible, for example, visibility of roads or low noise areas;**
- 2 The input datasets were classified as being either positive or negative – contributing to or detracting from the experience of tranquillity. For example, the ability to see the sea was positive and the ability to hear constant traffic noise was negative;**
- 3 All of the input datasets were classified and weighted to establish their relative significance. For example, remoteness from people was far more quantitatively significant in the model than overhead light pollution;**
- 4 These positive and negative weighted component datasets were then added together to give total scores. There were two total scores, one positive, one negative for the positive and negative components for each 250 m x 250 m grid square; and**
- 5 The resulting positive and negative layers were then combined for each grid square, but they were first weighted (total positive x 0.44, total negative x 0.56) in accordance with the relative significance of positive and negative factors from the PA data (see page 33). Figures 9 and 10 (overleaf) illustrate the weighted negative and positive factor maps respectively and the final relative tranquillity map is illustrated in Figure 11.**

Highest scoring  
for positive factorsLowest scoring for  
positive factors

### Using the results

The outputs of our research are:

- **A methodology; and**
- **Maps of relative tranquillity.**

These outputs can be used as:

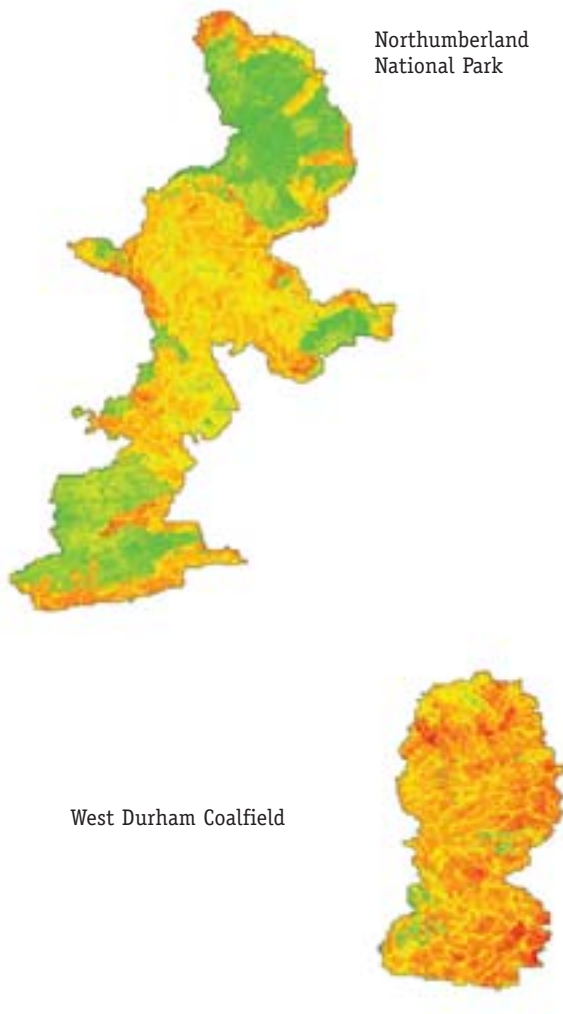
- **A land-use and landscape planning tool.** The separate component maps which together comprise the overall relative tranquillity map can be used to identify things that can be planned and managed to conserve and enhance tranquillity, as distinct from things that cannot;
- **Information for an environmental impact assessment (EIA);**
- **A regional image/promotional tool;**
- **A map on the wall, to be used as an explanatory/educational tool on tranquillity or to display people's experiences of tranquillity in specific places;**
- **A route to further research and understanding of the issue; and**
- **A campaigning tool.**

### Relative tranquillity

Our methodology produces a spectrum of more or less tranquil areas, rather than identifying absolutely 'tranquil areas'.

One of the findings was that people value tranquillity and tranquil places because of their experience of being in places that are not tranquil for much of their lives.

Respondents told us that perceptions of tranquillity and tolerance levels depend on what they are used to, and that it is a relative concept. Drawing a line on a map and stating that the area inside is tranquil and the area outside is not, is not justified on the basis of the Participatory Appraisal findings; indeed, most people would readily understand that such a line would not reflect their experiences of tranquillity. It also fails to reflect the fact



**Figure 9:**  
Composite map  
of positive factors

that many environmental qualities, such as tranquillity, vary in time as well as space and do not exist within neatly defined and geographically limited areas.

We use the term 'relative tranquillity' to describe what we are mapping. The tranquillity at any one locality (or grid square measuring 250 m by 250 m) is given by its score on a tranquillity scale or spectrum. At the top end of this scale is the score of the most tranquil grid square in the area, or areas, being mapped. At the bottom end lies the score of the least tranquil grid square. The score of any one square relates to this scale and all of the other grid squares which make up the maps.

Thus our method does not provide a quantified 'answer' to the question of what is tranquillity, but provides a basis for identifying the relatively most and least tranquil areas of a defined study area. Relatively tranquil areas are those where the physical and experiential characteristics of the landscape are more likely to provide countryside users with the space and conditions to relax, achieve mental balance and a sense of distance from stress. Relatively tranquil areas are characterised by a low density of people, minimal levels of artificial noise and a landscape that is perceived as relatively natural, with few overt signs of human influence.

The final composite tranquillity map, Figure 11 (overleaf), clearly shows that the Northumberland National Park is, at the aggregate level, a more tranquil area than the West Durham Coalfield.

It also contains the largest contiguous areas of high tranquillity scores, something that must be judged to be valuable. When they are being measured on the same scale and being compared to each other, squares in the national park and the West Durham Coalfield that are shaded the same colour – or have the same overall score – are as tranquil as each other.

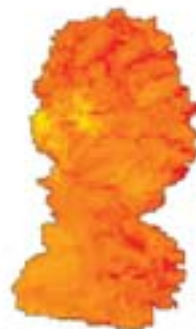
Highest scoring for  
negative factors

Lowest scoring for  
negative factors



Northumberland  
National Park

West Durham Coalfield



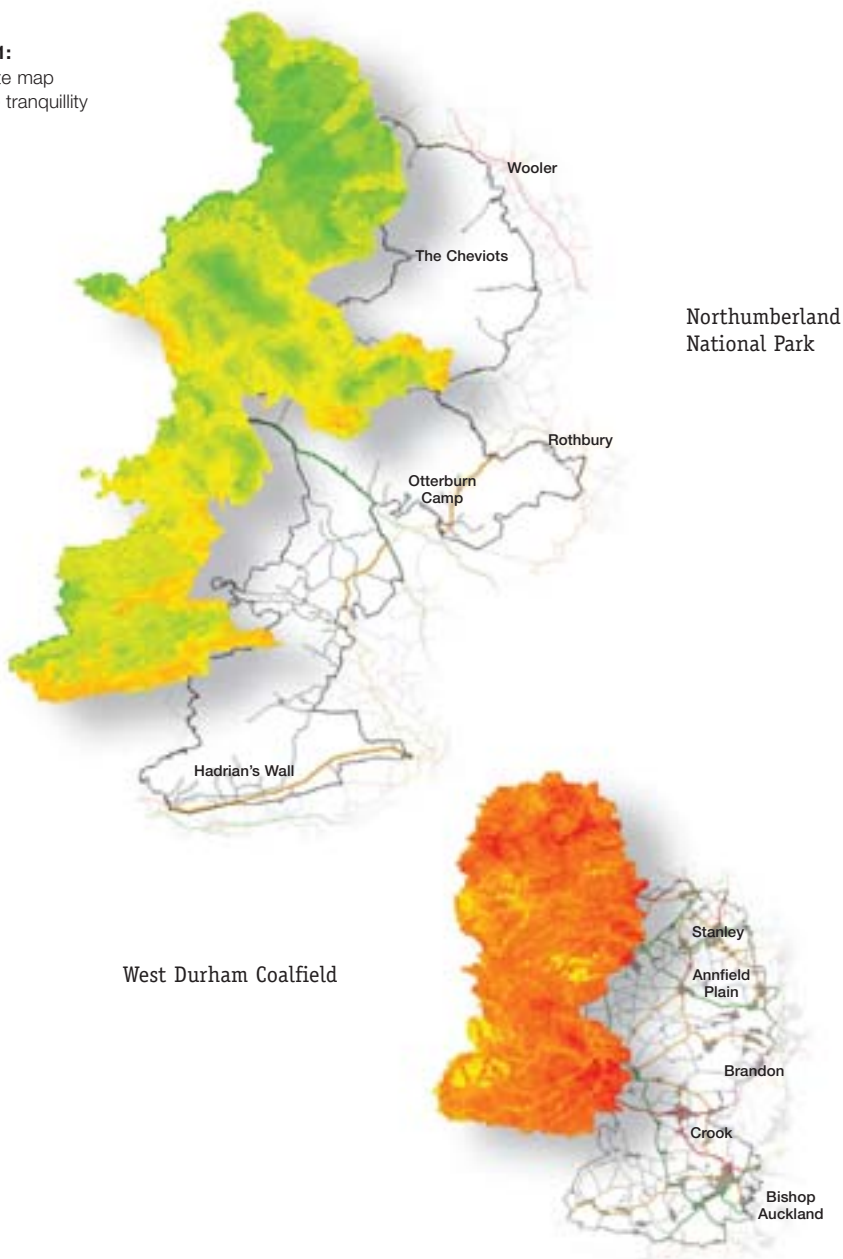
**Figure 10:**  
Composite map  
of negative factors

Relatively most  
tranquil areas

Relatively least  
tranquil areas

Kilometres

**Figure 11:**  
Composite map  
of relative tranquillity



However, a simple comparison between these two study areas risks undervaluing the parts of the West Durham Coalfield that are tranquil relative to other parts of this densely populated area. Indeed, several of the photographs illustrating this summary report show that the coalfield has substantial areas of attractive, undeveloped countryside. These locally tranquil areas may be of great value to local people, but compared to the huge open spaces and solitude provided within the national park they are not very tranquil at all.

One way of preventing locally tranquil areas from being undervalued by such 'unfair' comparisons would be to also draw the maps of the national park and the West Durham Coalfield on different tranquillity scales; a more detailed scale could be used for the coalfield that allows the different parts of this area to be more highly differentiated from each other. This would give a clearer indication of parts that are more tranquil than others. As we have mentioned, in an area where tranquillity may be rare, those places that do have it may be particularly valuable.

Figure 12 illustrates the results of the model for the West Durham Coalfield, exactly as they are in the composite map shown in Figure 11. However, Figure 13 illustrates the results when the model is run for the coalfield alone on a different scale. In this case the map does not show the relative tranquillity of the coalfield when compared with the national park, but it shows more clearly the relative distribution of the factors that contribute to and detract from tranquillity within the coalfield alone.

The original maps for CPRE/Countryside Commission were produced at a more crude spatial scale than this study, and they tended to eliminate local effects. One consequence of this can be to 'overlook' small areas which have a relatively tranquil character, even though their surroundings prevent them attaining higher tranquillity scores. Our approach therefore has both regional and local applications, identifying areas which have the relatively greatest or least amount of this particular environmental resource within that specific context. However, by running the model at a national level, particular regions and local areas could be judged (in respect of tranquillity) against a national yardstick, and the absolutely most tranquil areas within the country could be identified. This approach has established the technical basis for this, and further PA research is required in different parts of country to establish a nationally representative evidence base for the model.



Figure 12: Relative tranquillity across the West Durham Coalfield (WDC) when assessed relative to the WDC and Northumberland National Park.



Figure 13: Relative tranquillity across the West Durham Coalfield when assessed within the WDC alone.

- Urban areas
- A-Roads
- B-Roads

### Lessons from this research

This has been a pilot research project in two areas of North East England to develop a robust methodology for mapping tranquillity. Part of our approach has been to open up our research to allow comment on it, because of the consultative basis of our work and because what we have done is so novel.

There are a number of issues to consider here:

- **Boundary issues** – what can be seen and heard from outside a particular area impacts on the tranquillity within it. Obtaining data pertaining to locations outside of the study area is crucial, yet has proved difficult;
- **We have conducted PA** with key local stakeholders and countryside users in the two study areas. Further research with people who do not use the countryside would add depth to the findings;
- **Expanding the research** beyond the two study areas would provide an assessment of both aspects of the methodology: the consultation responses and the mapping. At the time of completing this report, research was being conducted in a second region, the Chilterns Area of Outstanding Natural Beauty in South East England;
- **Comparisons over time** for the same study area are supported by this approach. However, we assume that the findings from the original Participatory Appraisal exercise would have to be used as the basis for any subsequent tranquillity mapping of areas in order for the time comparison to be valid. Changes in tranquillity over the years would then be assessed on the basis of values expressed at the start of the time period in question, rather than taking into account any evolution of the values themselves over time. The likelihood of public responses remaining the same is an issue that needs to be addressed;
- **Further development** to enhance the ability of the existing consultation approach to elicit more specific details about people's tolerances of noise, other people and visual impacts in a relatively tranquil landscape are being considered, in order to develop a positive planning tool for use in a land-use planning and land management;
- **Comparisons between widely separated areas** are supported by this approach. The current results cannot be extrapolated to other areas or nationally, but this would be possible provided that the evidence base from Participatory Appraisal is built up on a national scale. This would establish the national minimum and maximum values for all of the parameters; these are required to set the tranquillity scores of individual regions and local areas within their national context. A common quantitative framework for inter-area comparisons can only emerge from a national study in which the views and values on tranquillity of a representative sample of the entire national population are appraised; and

**The results of this study** cannot be directly compared with the previous maps by ASH Consulting but they provide a baseline for future comparisons to monitor changes over time.





**Our approach is founded in broad-based consultation of countryside users as well as stakeholder groups.**




### Benefits of this approach

Above: Walkers in Northumberland National Park.

This research was commissioned to take forward previous work in mapping tranquillity and develop a methodology that was sufficiently robust that its results (tranquillity maps) would have credibility among relevant practitioners. The methodology should also be usable in an environmental assessment mode and as a planning tool. This would allow planners and developers to assess the impacts of proposed developments (visual, noise and perception related) on areas that are judged to be tranquil and worth protecting for that reason. The GIS model developed in this project meets both these requirements. The Regional Planning Guidance for the North East<sup>26</sup> states that development plans and strategies should identify, protect, and work to increase tranquil areas. Our methodology and maps provide a new approach for planning support which will assist planners in achieving this objective.

There are some issues arising (see above) that are relevant to any future development or application of the methodology. Further research would enable a better understanding of relative tranquillity and improve the method developed here for practical purposes. This research is not intended to be the final word on tranquillity – far from it. What we have done here is take a big step forward in our understanding of the issue, and highlight areas for further exploration.



**This methodology is significant because tranquillity is significant – it really matters to people.**

### Making progress

As has been previously mentioned, the earlier work on tranquillity mapping (1995) was subject to a detailed critique by CAG Consultants (2000).<sup>26</sup> It is therefore useful to reflect on this critique, and gauge the level of progress that this research can now claim.

**1 Issue:** 'The mapping uses a single threshold rather than a variation of levels of disturbance from distance from a source':

■ **Our response:** We have addressed this in full. Our maps have 'fuzzy boundaries' rather than sharp lines drawn on them.

**2 Issue:** 'The mapping does not take account of varying conditions, notably topography, vegetation and prevailing weather':

■ **Our response:** Topography and vegetation are explicitly addressed in the variables modelled, such as noise and landcover type.

**3 Issue:** 'There is insufficient consideration of factors that may or may not occur on maps or where maps provide insufficient information to estimate effects':

■ **Our response:** We have addressed this in full by using PA. This permits information about people's perception of tranquillity to be presented alongside the maps (and our PA data also stresses the importance of tranquillity to people).

**4 Issue:** 'There is a lack of detailed discussion of data sources and their limitations':

■ **Our response:** We have addressed this in full. We have aimed to be as transparent as possible in relation to both data and the processes that were carried out.



Above:  
Mountain bikers in  
Northumberland  
National Park.

**5 Issue:** 'No account is taken of cumulative effects':

- **Our response:** We have addressed this in full. Accumulation of visible, noise, and people-related nuisance has been included in this study.

**6 Issue:** 'There is limited consideration of intermittent and variable sources of disturbance':

- **Our response:** This would mean reconciling variable levels of nuisance, requiring additional scoring (and there is not PA data to directly support this). However, our approach would allow separate maps for different scenarios (for example for night time, weekend, winter).

**7 Issue:** 'No account is taken of interactions between factors and how they may effect the perception of tranquillity':

- **Our response:** We have addressed this by using the PA results to underpin the model, which is structured to represent perceptions of tranquillity. Exploring people's reactions to interacting factors is a step beyond this.

**8 Issue:** 'The selection of sources of disturbance seems to have been based solely on expert judgement, with little discussion or explanation. No empirical evidence is presented that they represent either the most significant factors or a sufficient set of sources to be (reasonably) comprehensive or representative':

- **Our response:** We have addressed this in full. This was a key point of principle and practice in this project.

### Conclusion

This research set out to develop a methodology that was robust and had the potential to support a range of activities, with land-use planning and landscape planning foremost amongst them. Our approach meets these requirements and satisfies many of the criticisms that have been made of previous mapping of tranquillity. Robustness is not just about processes; it is also about premises, and our approach is founded in broad-based consultation of countryside users as well as stakeholder groups. This breadth of consultation is as critical to the robustness of the methodology as the PA to GIS connections and the GIS techniques.

We have shown that the different experiences of tranquillity are a strength, rather than a weakness, of the concept. We have shown that tranquillity is a useful concept and can be used as a workable indicator. In this way, it can become part of the set of indicators that are used to assess countryside quality. What 'relative tranquillity' adds as an indicator is measure of 'experience' as well as 'performance'.

This methodology is significant because tranquillity is significant – it really matters to people. We have shown throughout this research that the experience of tranquillity and the features that are part of a tranquil experience are important. Although the concept currently merits a mention in a wide variety of significant documents, policies and reviews, unless the experiential or 'felt' aspects of landscape are considered alongside more easily quantified and indicated characteristics, landscape, countryside and environmental quality can only be partially safeguarded into the future. People value tranquillity and the places where people are more likely to experience it need to be identified and protected. This methodology shows how such areas that are significant at a national, regional and at a local scale can be identified.



## Endnotes

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Further copies of this summary report can be downloaded from the CPRE website at [www.cpre.org.uk/publications/landscape/tranquillity.htm](http://www.cpre.org.uk/publications/landscape/tranquillity.htm). Printed copies can be ordered from CPRE Publications – see contact details on the back cover.

The full report on which this summary is based can be downloaded from the following websites:

[www.northumbria.ac.uk/tranquillity](http://www.northumbria.ac.uk/tranquillity)  
[www.countryside-quality-counts.org.uk/](http://www.countryside-quality-counts.org.uk/)

For further information about the full report, please contact the authors above.

Photographer Michele Allen (whose work appears on pages 24, 25 and 29) worked alongside the tranquillity research group to produce a series of images and sound pieces. This followed previous work with a sustainable land management project in Co. Durham.

Other photography supplied courtesy of S Fraser, C J Williamson, C R Coulam, Alamy™, CPRE and Northumberland National Park Authority.



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The Countryside Agency is the statutory body working to make the quality of life better for people in the countryside and the quality of the countryside better for everyone.

It is a non-departmental body sponsored by the Department for Environment, Food and Rural Affairs (Defra).

The Agency is currently changing.  
From 1 April 2005 we will:

- Establish a distinctive new body to act as a rural advocate, expert adviser and independent watchdog with a particular focus on disadvantage.
- Our landscape, access and recreation teams are working with our partners, English Nature and the Rural Development Service. We will bring together our activities to improve services for customers, work effectively with partners and contribute to sustainable development as we move towards a new integrated agency formed following primary legislation.
- Transfer most of our socio-economic delivery functions to Regional Development Agencies and Defra for delivery through Government Offices.

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