



**PEAK
DISTRICT**
NATIONAL
PARK

Climate Change Adaptation Report 2016

June 2016

1. Executive Summary

This report sets out our progress in preparing for climate change. It follows our first round report *Adapting to Climate Change in the Peak District National Park* published by the Authority in September 2011 (hereafter referred to as the 2011 report). Moreover, we present our future approach to managing and monitoring climate change adaptation.

Climate change will change the nature of the Peak District National Park's special qualities through its impact on the important park features and the other factors affecting them. Climate change will also alter the nature of the opportunities for the public to enjoy the special qualities and the benefit from the ecosystem services many important features (the natural capital) of the National Park provide.

Potential actions identified in the 2011 report were drawn from these projects and areas of work and, as a set, they presented the scale and focus of our approach. Climate change has been integrated into the different activities which we undertake to meet our corporate and National Park Management Plan objectives to deliver our statutory purposes. Significant progress has been made across all areas of work of the National Park Authority regarding mitigation and improving resilience with regard to climate change.

The 2011 national programme did not achieve a basis for prioritising action. The Authority's 2011 report highlighted potential impacts and intended to set the background for informed conversations and integration of climate change mitigation and adaptation into the National Park Management Plan. Successful adaptation will be entirely dependent on how well we can work and communicate with legislators, stakeholders, partners, funders, and beneficiaries. The vehicle for this is the National Park Management Plan. Our principal recommendation is that climate change will be considered at the core of our management planning processes as a "super factor" affecting the special qualities of the National Park.

In terms of climate change our strategy will follow a simple approach - hope for the best and plan for the worst. Our management planning processes will use the framework of planning for the consequences of a 2°C rise in global temperatures by 2040 and a 4°C rise by 2100. Using a 2°C and 4°C rise in our approaches means we are taking appropriate steps to manage one of the key climate change uncertainties. Furthermore, a climate focused approach to management planning will be used which allows flexible, adaptive objectives and actions to be developed with partners and stakeholders.

We will use a two stage prioritisation process. We will choose a manageable subset of the most important features of the National Park that we regard as the highest priority for intervention. We will then assess the degree to which our priority features are most vulnerable to climate change. This will provide us with a focussed approach to understanding the evidence, knowing which features to focus on, and understanding what role the Authority can play in terms of deliverables. Our aim is that this risk assessment will enable us to prioritise 25% of features in the National Park to concentrate our efforts on over the next five years.

Moving forward our monitoring and evaluation must provide us with sufficiently accurate information to allow us to determine how closely our plans match real world conditions as they evolve. It must also provide us with an evidence base that is sufficiently flexible or dynamic to accommodate the changes that we need to make. We therefore need to set process indicators that give us intermediate points along the adaptation pathway allowing us to use monitoring and evaluation to reconsider our interventions, and where appropriate, re-consider our objectives.

2. Introduction

This report sets out our progress in preparing for climate change. It follows our first round report *Adapting to Climate Change in the Peak District National Park* published by the Authority in September 2011 (hereafter referred to as the 2011 report). Moreover, we present our future approach to managing and monitoring climate change adaptation.

2.1 The Peak District and Authority

The Peak District National Park was the first UK National Park to receive designation (in 1951) for the international significance of the Peak District Moorlands and Dales outstanding landscape, environment and wildlife. Every year millions of people visit to take part in a very wide range of activities. 20 million people live in close proximity to the National Park (within an hour's travel) and approximately 38,000 people live here.

The Peak District National Park Authority is the guardian of the Peak District National Park with clearly defined statutory purposes to:

1. Conserve and enhance the natural beauty, wildlife and cultural heritage.
2. Promote opportunities for the understanding and enjoyment of the special qualities of National Parks by the Public.

(DEFRA, 2010)

In doing this, our duty is to seek to foster the economic and social well-being of the local communities within the Peak District National Park. We are a statutory Local Planning Authority and have responsibility for setting the policy framework for development, including on mineral working sites. The Authority is an 'Access Authority' for the purposes of managing public access to 37% of the Peak District National Park which is open country under the Countryside and Rights of Way Act 2000.

The Authority is required to prepare a National Park Management Plan to deliver its role, and review it at least every five years. This sets out partnership work on climate change, as relevant actions from the 2011 report were incorporated into the National Park Management Plan rather than having a separate action plan. Furthermore, elements of climate change adaptation and mitigation are reflected in all other policy plans and strategies covering specialist areas of work. Our legal requirements include preparing a Local Development Plan and operating the planning system for the Peak District, which is a key instrument for achieving our purposes and putting into practice the aims of the climate change legislation.

2.2 Climate change as a super factor in the Peak District

The global climate is warming as a result of human influences. It is projected that global CO₂ emissions from human activity will continue to increase atmospheric CO₂ concentrations and force an increase in average global temperatures. As a result, it is likely that average global temperatures will rise above the 2°C 'safe' target by the 2040's and rise over 4°C by 2100 (IPCC, 2014) (CCC, 2015). Therefore, in all our future work we will use the framework of planning for the consequences of a 2°C rise in global temperatures by 2040 and a 4°C rise by 2100.

Significant changes to temperature and weather are happening in the UK with relatively little global climate change (Suggitt, et al., 2015). In a warming global climate UK winter rainfall and all year round temperature increases and extreme events (precipitation, drought, wind, and temperature) will have become both more common and more severe by the time average temperatures reach the 2°C threshold. This process would continue should world average temperature increases pass 2°C.

Climate change will change the nature of the Peak District National Park's special qualities through its impact on the important National Park features and the other factors affecting them. It will also alter the nature of the opportunities for the public to enjoy the special qualities and the benefit from the ecosystem services many important features (the natural capital) of the park provide. As a result, our conservation, enhancement, understanding and enjoyment based objectives will need to change.

In terms of the features of the Peak District National Park, it is important to be aware that changes are already in progress. We are already recording species distribution changes and recommending adaptive approaches to heritage restoration and maintenance. In a 2°C warmer world, the nature of

the National Park will be changed, and this means we will need to change our approach to setting our conservation aims and objectives. Therefore, we recognise that we cannot manage the National Park to 'keep it the same' or create and preserve a particular historical state. We need to manage the process of evolution of the park in responding to climate change. We must develop objectives and means of monitoring so that our management of the park focusses on responding to and influencing change. It is our role to ensure that the interaction between people and nature that created the distinctive character of the area, expressed through the special qualities and formed by the aesthetic, cultural and ecological features and high biodiversity value, are managed.

We must use our understanding of future climate to help inform a paradigm shift in the practice of protected area management and conservation. For us, the place for this is the National Park Management Plan process. We need a climate change focused adaptive approach in which we work with partners and stakeholders on shared objectives and actions which are:

- Linked to climate impacts.
- Have flexible, forward looking goals.
- Embrace landscape scale contexts.
- Robust to (climate) uncertainty.
- Employ agile and informed management.
- Minimise carbon footprint.
- Account for climate influence on project success.
- Safeguard people and nature.
- Avoid maladaptation to climate change.

Climate Smart Conservation (Stein, et al., 2014)

An adaptive management based approach has begun within the Authority to develop definitions of the National Park's special qualities in terms of the most important features (landscape, wildlife and cultural heritage) and the factors which affect them. Climate change, along with resources (time and money from all partners) and legislation (local, regional, national and international policy delivery), is regarded as a 'super' factor affecting the National Park's special qualities through direct effects on the features and through its considerable influence on other factors and our ability to control them.

We are not able to take control of or directly manage super factors in the same way that we can other factors. We can do little alone or with our local stakeholders and partners to influence global climate trajectories only national and international actions can achieve change at that scale. Steps in this adaptive planning process will however allow for the above principles to be incorporated so that we are able to manage the National Park's features' vulnerability to climate change and facilitate mitigation, resilience and adaptation in response to changes in local climate (Stein, et al., 2014). In this way our local actions can, and do, contribute to managing the global problem.

3. Approach to reporting

3.1 2011 report

As an Authority, we are obliged to adhere to the 2008 Climate Change Act. The Act set a nationwide goal of reducing greenhouse gases to 80% of 1990 levels by 2050. The 2011 report was our first assessment of potential climate change adaptation related risks to the Peak District National Park, and was based on a template adopted by all National Park Authorities. The report provided a 'best guess' approach and was intended to be the starting point of an iterative process to improve our understanding of the impact of climate change on the special qualities of the Peak District National Park.

The 2011 report was based around a single climate scenario: the medium greenhouse gas emissions central estimate which was in line with the UK government's assumptions based on the UKCP09 projections. Details of the methodology can be found, along with the comprehensive risk/opportunity assessment, in the 2011 report.

The process of producing the 2011 report was a smaller scale mirror of the National Adaptation Programme (NAP) process (CCC, 2015). The feedback we received from Defra on the 2011 report highlighted our engagement with stakeholders, incorporation of climate change actions into the National Park Management Plan and our clear understanding of interdependencies and barriers to adaptation as strong elements (Defra, 2012). The weaknesses in the 2011 reporting approach were common across the whole NAP and this hindsight is important in developing our future climate change adaptation strategy (see section 5).

The main aim of the 2011 report was to promote discussion on climate change adaptation both within the Authority, stakeholders and with partners. As a result of this, extensive consultation the climate change considerations in the report were embedded within actions across the Peak District National Park via the National Park Management Plan Delivery Plan.

3.2 2016 report

In January 2015 National Parks England and Environment Agency took part in a workshop to work on a common approach to Climate Change Reporting for National Parks. The following additional advice and guidance was given at the conference.

- Our update should set out clear plans for embedding the adaptation and mitigation risk management, and appropriate monitoring and evaluation. It should not be a stand-alone document that was less likely to be implemented.
- Our update should address the information requested in the guidance/update our action plan in a way that is useful to us.
- Our update should highlight to government what needs to happen outside of our direct sphere of influence.

Following this guidance, we have used the report structure to plan and present our next steps in climate change risk and opportunity management. In preparing this report we have consulted with specialist officers within the Authority. The outcome of these conversations and consultations has been used to judge progress against action in our 2011 report (see section 4 and appendix 1) and to review and reconsider our approach to climate change risk management (section 5).

4. Details of Actions

In carrying out our climate change role, we deliver projects and programmes through our own operations as set out in the Peak District National Park Authority Performance and Business Plan and through the partnership approach set out in the National Park Management Plan. These deliver across the National Park Management Plan the following themes.

- A diverse, working and cherished landscape
- A welcoming and Inspiring place
- Thriving and vibrant communities
- An enterprising and sustainable economy

Potential actions identified in the 2011 report were drawn from these projects and areas of work and, as a set, they presented the scale and focus of our approach. Climate change has been integrated into the different activities which we undertake to meet our corporate and National Park Management Plan objectives to deliver our statutory purposes. Unfortunately, we are not able to report on each detailed potential action identified in the 2011 report. This is because monitoring was not carried out in a way that would allow us to extract meaningful information, as actions were incorporated into corporate and partnership working through multiple programme and project streams. However, it is clear that significant progress has been made across all areas of work of the Authority with mitigation and improving resilience with regard to climate change.

Appendix 1 sets out our achievements on climate change adaptation since 2011. The remainder of the section outlines a selection of work we are particularly proud of in terms of their contribution to reducing carbon emissions, improving the National Park features resilience to climate change and adaptation to lower carbon and warmer global climate in the future.

Moors for the Future

The Moors for the Future partnership is a successful and influential cross sectorial approach to the management of upland moorlands and associated habitats at a landscape scale. The project team has carried out work with partners on a range of sites across a number of character areas from Edale in the Peak District National Park up to the Nidderdale AONB on the borders of the Yorkshire Dales National Park. Between 2003 and 2015 the partnership secured £13m to invest in improved landscape, wildlife and cultural heritage management, improvements to water quality, flood prevention and carbon storage.

A suite of science, education, outreach and cultural heritage projects accompany the practical restoration and management projects. This work helps people to explore and make a connection with the moorlands, and understand how local environments are linked to global issues. The partnership has had an international impact on peatland restoration and is an example of best practice leading work in this field. Key outputs since 2011 include the following.

- Bringing around 4000ha of moorland into restoration management.
- Clough Woodland management and restoration (catchment scale land use change).
- Demonstrating how investing in moorland management and restoration helps with flood management and water quality.

Recent development work has seen the partnership secure a €14m bid to the EU Life program to expand its ground breaking partnership work to cover 9,500ha of blanket bog. Please see the [Moors for the Future](#) website for details on the partnership.

Carbon Management Plan

National Park Authorities report their emissions in accordance with the DECC guidance¹. Since 2008 the Peak District National Park Authority has to date reduced its total CO₂ emissions by around 20%/250t CO₂ per annum. This has been achieved through a range of measures across its property portfolio as set out in the Authority's Carbon Management Plan.

Within the plan, the Authority established a series of 'demonstration projects' in order to provide practical examples of how carbon emissions reduction could be achieved within a protected landscape. These well-communicated high profile activities are intended to help others to learn from

¹ <https://www.gov.uk/guidance/measuring-and-reporting-environmental-impacts-guidance-for-businesses>

our experiences and support them to take projects forward within their own organisation or community. A range of projects has been completed to date. Examples include large and small biomass boiler installation at various sites, coupled with energy efficient refurbishment of tenanted farm buildings to very high standards of insulation and airtightness and conversion to LED lighting in our main offices.

Climate Change and Sustainable Building Supplementary Planning Document

The Climate Change and Sustainable Building Supplementary Planning Document (SPD) has been professionally designed to make it a more attractive and easier to read document. In addition, alongside this on our website, four case studies have been developed to illustrate the practical implementation of the theory in the SPD. Two of the case studies are illustrated in videos so they are in a more engaging format. We have a commitment to add new case studies as new innovative schemes come forward.

5 Understanding Climate Risk management in a protected area context

As presented in section 2, we regard climate change as a principal or ‘super’ risk factor affecting the important features of the Peak District National Park and ultimately the special qualities that the public enjoy. Funders, partners and stakeholders with an interest in the National Park do not have the resources to attempt to manage all risks, therefore, we must prioritise the areas where we believe we can make the most appropriate and efficient interventions in pursuit of our objectives. This prioritisation is a two stage process.

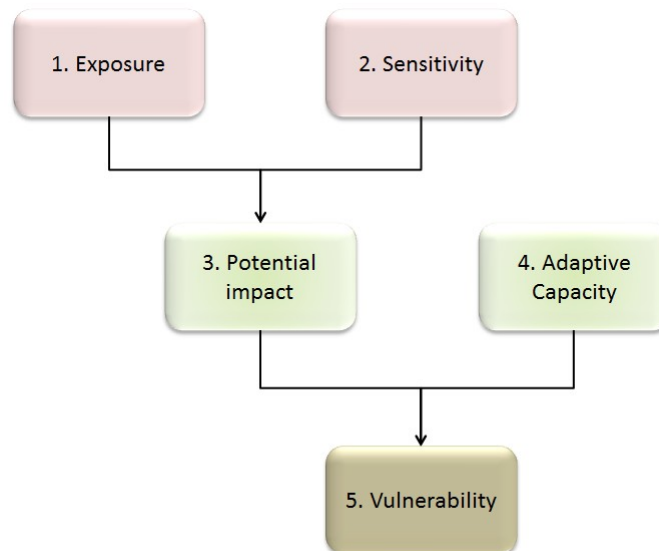
As a first step, we have to choose a manageable subset of the most important features of the Peak District National Park that we regard as the highest priority for intervention based on the following.

- Quality of data and information available to judge current condition of the feature.
- The level of influence partners are able to bring to bear on the management of the factors affecting the feature.
- The role and scale of investment partners are able to support in the care of the feature and the monitoring required.

We will then assess the degree to which of our priority features are most vulnerable to climate change and identify key vulnerabilities (Glick, et al., 2011) (Stein, et al., 2014). As part of the same process we will develop our understanding of how climate change will interact with the other factors affecting the Peak District National Park’s priority features. This will provide us with a focussed approach of understanding the evidence, knowing which features to focus on, and understanding what role the Authority can play in terms of deliverable. Our aim is that this assessment will enable us to prioritise 25% of features in the Peak District National Park to concentrate our efforts on over the next five years.

It is critical to understand the current condition (good/bad) and status (is it stable/declining/improving) of any feature when assessing its vulnerability to climate change. The risk information in the 2011 report provides a simple process to develop a vulnerability assessment for our priority features. This is a stepwise process, as set out in figure 5.1.

Figure 5.1: Key components of vulnerability assessment (after Glick, et al., 2011).



Using the 2011 report risk assessment, Authority and partner expertise, we can carry out a vulnerability assessment of the priority features of the Peak District National Park. This would fit in with integrating our separate strategies (Biodiversity, Cultural Heritage, People and Park Connected, etc.) into the National Park Management Plan. The process will enable us to identify and test our key vulnerabilities to climate change, and provide an informed basis for prioritisation (Stein, et al., 2014). This approach also meets the recommendations in the recent CCC report (CCC, 2015) and the 2015 Paris Agreement (DEFRA pers. comm.).

It is important to note that for the Peak District National Park the conservation feature set includes wildlife, landscape and cultural heritage features as described in the UK National Park’s statutory

purposes and the IUCN Category V definition. This is different to traditional protected area adaptive approaches, which focus principally on habitats and wildlife.

5.1 Potential (climate related) impact

The potential impact of climate change on the priority features is a product of their exposure and their sensitivity to the effects of exposure (see fig 5.1). Sensitivity is the degree to which our conservation target for a feature may be influenced, positively or negatively, by exposure to climate change or its interaction with other features (Glick, et al., 2011) (Stein, et al., 2014) (Natural England and RSPB, 2014).

The climate risk assessment in the 2011 report used a baseline from the central estimate produced in the UKCP09 climate projections, following best practice at the time. It represents a comprehensive assessment based around a 2°C rise projection and is an excellent base from which to continue to develop our response to climate change. There is however a growing acceptance that this 'central estimate' approach does not provide enough risk information to plan and adapt to climate change if used in isolation. Including information on risks regarded as extreme (low likelihood and high impact) is an important component of robust risk management practice and supports more flexible strategy development.

Background work on the evidence base for the 2016 UK Climate Change Risk Assessment (CCRA2) is incorporating extreme scenarios in order to compare low likelihood high impact events against the more likely outcomes (Wade, et al., 2015). This approach does the following.

- Is useful for exploring longer term climate change, identifying a wide range of adaptation options or adaptation pathways and discover the 'limits of adaptation'.
- Helps to identify specific types of adaptation, for example flexible plans that can be adjusted if rates of warming are greater or less than anticipated or used to highlight the importance of monitoring to understand trends or rates of change.
- Useful for screening risks or to set the boundaries for more detailed sensitivity analysis, impact assessment or risk assessment studies.

(after Wade, et al., 2015)

Work by the Royal Society for the Protection of Birds (funded by the HLF) has found that adopting future climate impact scenarios based around more than one projected temperature increases is an effective method of incorporating more extreme exposure information in the risk analysis (Dr Olley Watts Pers. Comm.) (see also Stein, et al., 2014). In the method two or more 'tangible future' baselines are chosen; in the RSPB/HLF approach a 2°C and 4°C (warmer) world are used.

Combining the approach of using the 2°C and 4°C worlds as baselines and including high impact low likelihood scenarios will give us a more considered, robust risk assessment base. This broader understanding of potential impact will allow us to judge how exposed (see fig 5.1) each priority feature of the Peak District National Park is to the direct and indirect effects of climate change. A further benefit is that this approach will be in line with the UK CCRA2, and funders and partners and should prove easier to communicate. It is also a crucial step in managing uncertainties in a flexible way (See sect 5.5).

We can then use this refined risk information to define the potential impacts, positive and negative, of climate change on our important Peak District National Park features and on the ecosystem services they provide to the people of the UK.

5.2 Vulnerability

Vulnerability is our understanding of the potential impact on our features and the adaptive capacity of the feature to accommodate climate change impacts. Adaptive capacity consideration is a crucial step, as it is where interdependencies with other key factors that influence vulnerability are explored more fully. A factor is anything that has the potential to influence or change (positively or negatively) a feature, or to affect the way in which a feature is managed. These influences may exist, or have existed, at any time in the past, present or future (Alexander, 2010). There are strong interdependencies between different factors and many relate to the barriers and interdependencies identified in the 2011 report.

The management of the features of the Peak District National Park (or any protected area) is nearly always about controlling factors (Alexander, 2010). An example is where habitat fragmentation or land use practice is a limiting factor on the ability of wildlife to disperse in the landscape in order to move to more suitable areas under warmer conditions. In this instance, we are more likely to focus on landscape management as a factor because this intervention may facilitate an adaptive response, and reduce vulnerability, rather than any in situ approach dealing directly with effects of climate change (shading, improving water storage etc.) (Stein, et al., 2014).

A vulnerability assessment provides a rigorous and clear context for linking our adaptation actions to climate impacts and the management of other factors. It also provides us with the information base to draft a prioritised list of actions based on key or critical vulnerabilities (Defra, 2015) (Stein, et al., 2014).

5.3 Using key vulnerabilities to inform action

There are a range of criteria we can use for identifying key vulnerabilities. In our context the key vulnerabilities will be those that represent the greatest risk to our achieving our conservation and enhancement objectives for our priority landscape, wildlife and cultural heritage features. By default, they also represent the greatest risk to the special qualities of the National Park and the enjoyment of them by the public.

Bringing the identification of key vulnerabilities into the National Park Management Plan process connects with broader stakeholder engagement. It places the intentional and deliberate consideration of climate change in the development of forward looking goals for the parks special qualities, important features, promotes understanding of climate changes interaction with other factors affecting National Park features, and provides a basis for monitoring and evaluation.

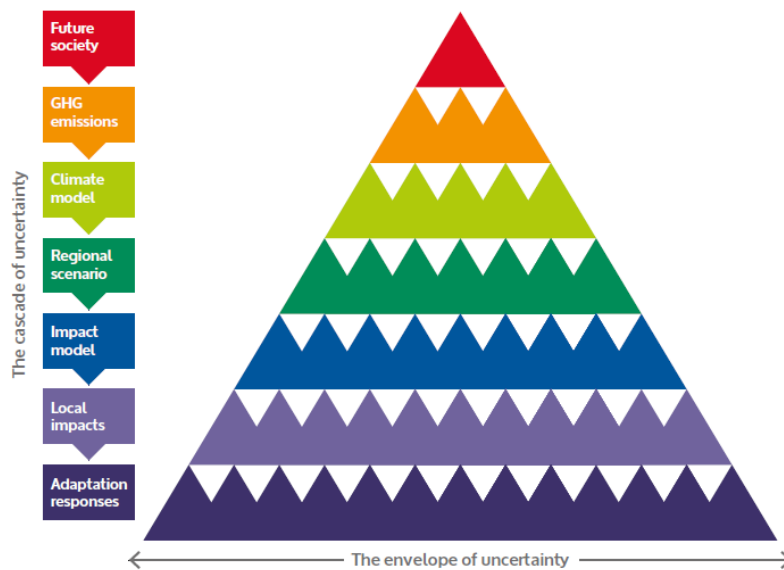
5.4 Thresholds

We were unable to identify specific thresholds in our 2011 report, although many of the risks we identified are likely to experience tipping points which may feedback to our functions as an organisation. Whilst it is clear that landscapes, habitats and species have critical thresholds, predicting such critical points before they are reached is extremely difficult. With climate change, where changes in the conditions for National Park features may be swift and permanent, we may not be able to detect early warning signals. A further issue arises where other significant factors change over time, distorting or contracting any signals. Furthermore, long lead in times to shifts requires long term data collection which is difficult to resource. We are far from being able to develop accurate models to predict thresholds in most complex systems, such as ecosystems or the climate. However, prioritising such research over practical action may not be a good use of limited resources, even where uncertainty is prevalent, therefore, there is a balance to be met.

5.5 Understanding Uncertainties

Uncertainty in monitoring and evaluating climate related risks stem from the fact that effective adaptation responses cut across scales and sectors of intervention, and extend long past any normal project cycle (Bours, et al., 2014) (CCC, 2015). Uncertainty related to climate change is driven by the fact that the future global society has a range of likely greenhouse gas emissions. This range of scenarios generates a further range of global climate model results. Each climate model generates a range of regional climate scenarios which in turn result in a number of regional and local impact scenarios – an ‘envelope of uncertainty’ (see fig 5.2).

Figure 5.2: (Wilby and Dessai cited in (Bours, et al., 2014))



Other, related, uncertainties include the future:

- Climate system changes (Ocean Currents, Jet Stream etc.)
- Greenhouse gas emissions (Human and earth systems)
- Ecosystem/landscape scale responses
- Human responses
- Effectiveness of policy/regulatory and management
- The stochastic nature of the effect of all the above.

(after Stein, et al., 2014)

Being uncertain is, however, not the same as knowing nothing; uncertainty can and should be used to inform decision making. Our task as custodians of a protected area is to focus on moving from understanding to action within the envelope of uncertainty. We cannot afford to wait for or invest in 'certainty'. As noted in section 5.4, we can often only be certain about landscape and species changes after they have occurred and it is then too late to change the course of action. Fortunately there are planning and management tools that support the need to develop plans and actions which deal robustly with uncertainty.

Adaptive Management is one of the most widely employed approaches to management when there is critical uncertainty (Alexander, 2010) (Stein, et al., 2014). It recognises that it is often best to increase understanding of a particular feature or resource while still making decisions based on the best available data and knowledge. Adaptive Management emphasises the need to change or adapt management through time recognising that planning should be a continuous, iterative and developmental process. This is a process in which management activities are implemented in spite of uncertainties about their effects, the effects of management are measured and evaluated, and the results are applied to future decisions.

As noted in section 2.2, the Authority has started to define its special qualities based on Adaptive Management principles. Using this approach allows the Authority and its partners to take action on climate change and the other factors affecting the features of the Peak District National Park, whilst at the same time gathering information through monitoring and evaluation to help refine our objectives as we move forward. This means that our plans can be simple outline statements that grow and embrace change through time, avoiding the need for long time periods for research or plan writing before doing work.

6 Monitoring and Evaluation

Throughout this document monitoring and evaluation is identified as of central importance to our approach to managing climate change adaptation in the National Park. Without appropriate monitoring and evaluation we would not be able to report on the significant progress we have made since 2011 (appendix 1). Moving forward, our monitoring and evaluation must provide us with sufficiently accurate information to allow us to determine how closely our plans match real world conditions as they evolve. It must also provide us with an evidence base that is sufficiently flexible or dynamic to accommodate the changes that we need to make.

In this report we do not consider indicators. The recommended work on vulnerability assessment, the National Park Management Plan review and the work on definitions of the special qualities of the National Park will identify appropriate indicators and set out clear methodologies. The National Park Management Plan is also the place for more considered mapping of the interrelationships between factors and features that contribute to the special qualities. The National Park Management Plan will explore the complexities responding to a super factor like climate change brings to monitoring and evaluation.

6.1 Understanding climate change adaptation monitoring.

Work by the UKCIP² has highlighted twelve challenges that make monitoring and evaluation of climate change adaptation (CCA) approaches difficult. Many of the difficulties can actually apply to all long term management programmes and are consistent with management focused on the protection and maintenance of landscapes, natural capital and ecosystem services.

1. Adaptation is not an objective or end point.
2. Long timeframes stretch far beyond common project/programme cycles.
3. Uncertainties are inherent when implementing CCA interventions (see sect 5.5)
4. Measuring avoided impacts is very difficult.
5. Diversity of key concepts and definitions.
6. Tracking a 'moving target' is very difficult.
7. Climate change is global – but adaptation is local.
8. Adaptation spans multiple scales and sectors.
9. Assessing attribution versus contribution.
10. No one set of indicators or Monitoring and Evaluation approaches.
11. Causing harm: the 'maladaptation' problem.
12. Conflicting purposes and fit: when 'sustainable development' and adaptation are not interchangeable.

(Bours, et al., 2014)

In order to meet these difficult challenges in monitoring and evaluation we need an informed, nuanced and strategic approach. We cannot monitor climate change in isolation as many factors affect the National Park features and they all interact with climate change. As noted in section 2.2 climate change, along with other super factors, is an 'absolute' circumstance changer. Super factors operate at scales which are outside of our direct control and sphere of influence. They can independently and suddenly change our frame of reference for the following.

- Stakeholder/Partner priorities.
- Project support.
- Programme focus.
- What we are expected to regard as important, good, or special.
- The level of influence and status of other factors.
- How we can intervene and manage features and factors.
- The context for our conservation feature objective setting.
- How the special qualities of the National Park are understood and enjoyed.

Climate change requires us to think differently about how we monitor and evaluate work on long term outcomes. In common with our need to prioritise which features we focus on, we do not have the resources to monitor everything. We must prioritise those areas where we believe monitoring will be most informative and where we can be sure it will be properly resourced. In section 5 we showed how identifying and prioritising key vulnerabilities requires us to manage uncertainty through

² Formerly known as the UK Climate Impacts Programme

monitoring and evaluation. The same prioritisation process will also provide a focus for our monitoring and evaluation.

One of the criticisms of the NAP has been that there are too many process related objectives (CCC, 2015). The (Bours, et al., 2014) 'twelve challenges' arise from the fact that in responding to climate change we are embarking on a long term process of change where fixed outcomes are likely to be increasingly rare. We have little choice in this so we must look at our approach to process indicators, as these are, in many instances, the appropriate tools.

In process related approaches we are less concerned with specific/fixed outcomes. Our monitoring and evaluation must instead provide us with the indication that we are travelling in the right direction and not doing harm (maladaptation). We therefore need to set process indicators that give us intermediate points along the adaptation pathway, allowing us to use monitoring and evaluation to reconsider our interventions, and where appropriate, reconsider our objectives.

7. Conclusions

Our long term goals in a National Park context are set out by UK legislation (Defra, 2010) and the IUCN³. It is our task to ensure that the special qualities of the National Park, which are the expression of the distinctive character of the place produced by the interaction between people and nature over time, continue to evolve retaining significant aesthetic, cultural and ecological value with high biological diversity, which can be understood and enjoyed by the public. Climate change presents a strategic challenge unlike any encountered since the creation of protected areas such as the UK National Parks. In order to meet this challenge we need to develop our approach to how we guide the management of these places, as set out in the following conclusions below.

7.1 Incorporate climate change adaptation into the next review of the National Park Management Plan

Successful adaptation will be dependent on how well we can work and communicate with legislators, stakeholders, partners, funders, colleagues and beneficiaries. The vehicle for this is the National Park Management Plan. Our principal recommendation is that climate change will be considered at the core of our management planning processes as a super factor affecting the special qualities of the National Park.

In terms of climate change our strategy will follow a simple approach - hope for the best and plan for the worst. Our management planning processes will use the framework of planning for the consequences of a 2°C rise in global temperatures by 2040 and a 4°C rise by 2100. Using a 2°C and 4°C rise in our approaches means we are taking appropriate steps to manage one of the key climate change uncertainties. Furthermore, a climate focused approach to management planning will be used which allows flexible, adaptive objectives and actions to be developed with partners and stakeholders.

7.2 Carry out a climate change vulnerability assessment on 25% of our features

The 2011 report provided a comprehensive and detailed risk assessment of potential impacts. Whilst risk assessment is a crucial first step, we need to understand how exposed the priority features of the peak district national park are to different scenarios of climate change and how vulnerable they are. Section 5 sets out the framework for vulnerability assessment. Using vulnerability assessment techniques we will be able prioritise action and develop forward looking goals through the identification of key vulnerabilities. Our aim is that this assessment will enable us to prioritise 25% of features in the peak district national park to concentrate our efforts on over the next five years.

7.3 Develop a programme of monitoring and evaluation to manage uncertainty and measure the effectiveness of adaptation measures

There are significant levels of uncertainty when it comes to predicting the impact of future climates. Adaptive management approaches help us to address uncertainty through using effective monitoring and evaluation to test the effectiveness of objectives and actions. In section 6 we listed the 12 key challenges to monitoring and evaluation of climate change adaptation actions. Many of these challenges arise from the fact that climate change adaptation is a long term change process without an endpoint. We will use process indicators, based on our key vulnerabilities, that help us track and adapt the change pathway through time.

³ http://www.iucn.org/about/work/programmes/gpap_home/gpap_quality/gpap_pacategories/gpap_category5/

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Appendix 1 Summary of progress on climate change

Climate change has been integrated into the different activities that we undertake to meet our National Park Management Plan objectives to deliver our statutory purposes. The following summary reports on each of these areas in turn.

1. Strategic Landscape projects

1.1 Moors for the Future

Please see section 4 of the main report for a summary or the [Moors for the Future](#) website for details on the partnership.

1.2 South West Peak Landscape Partnership

The South West Peak Landscape Partnership is developing a program comprised of a number of projects that address the Heritage Lottery Fund (HLF) outcome areas (Heritage, People, and Communities) and focus on managing and interpreting the work to promote understanding of the Peak District National Park special qualities of the landscape. The details of the projects are being further developed by the partners in a HLF funded development phase. They consist of a suite of activities and initiatives that do the following.

- Through education and engagement build connections between visitors from local towns, volunteers and those managing and living in the landscape.
- Support sustainable land management that benefits land managers and the natural beauty, wildlife and cultural heritage of the landscape.
- Help protect public assets into the future through educating and training young people in land, heritage and wildlife conservation skills to look after the landscape into the future.

An element of the planning phase has been trialling the developing RSPB/HLF model climate change vulnerability assessment (see section 5 of the main report).

1.3 Sheffield Moors Partnership

The Sheffield Moors Partnership covers the moorland and associated landscape, habitat and cultural heritage features in the eastern part of the dark peak area within the Peak District National Park, from Wyming Brook in the north to Birchen Edge in the south. The partnership works at a landscape scale across the area and aims to bring about a holistic approach through a range of sites in different ownership through stakeholder and community engagement. Within this approach it has a climate change priority focused on facilitating adaptive capacity:

'habitat management that helps instil resilience to climate change in existing habitats, and at the same time, promotes adaptation to climate change to facilitate the ability of southern species to spread northwards..'

Please see the [Sheffield Moors Partnership](#) website for more details.

1.4 Dane Valley Woodlands

The Dane Valley Woodlands Project worked to increase awareness and bring large areas of upland oak woodland into positive conservation management through Environmental Stewardship and Woodland Grant Scheme agreements. In total, 41 schemes were negotiated incorporating almost all the important woodland resource in the valley. Upland oak woodlands are at the south-eastern edge of their British range in the Peak District, and are highly vulnerable to climate change requiring cool damp summers to prosper. The project sought to make these woodlands more resilient to climate change.

1.5 Breeding Wader Recover Project

The Peak District Wader Recovery Project is a joint project between Natural England and the Peak District National Park Authority, its purpose is to reverse the long term decline in the populations of key wader species such as lapwing, snipe and curlew. The decline is mainly due to historic changes in farming and land management. Climate change will influence the distribution of these species in future. Snipe and curlew are regarded as highly vulnerable to the effects of climate change in the UK.

For over 20 years, Environmentally Sensitive Area (ESA) schemes, other agri-environment schemes, and the project partners have focussed on habitat management. This work has shown that active promotion of agri-environment schemes, targeted advice and assistance to landowners has helped to

maintain populations of lapwings at key sites. The decline in wader populations has been well documented since 1985. In 2010 it was considered that numbers were critically low, particularly for lapwing and snipe (lapwing 58 pairs, snipe 73 pairs and curlew 104 pairs). The project objective is to increase the size and extent of suitable habitats to support these birds.

2. Grant Funding

2.1 Direct Grants

Since 2011 we have supported community led initiatives with staff time and over 70 small grants supported from various sources. Many of which have a sustainable/resilience education and awareness theme or are linked to carbon emissions reduction, sustainable travel and habitat/heritage management. We have also supported social enterprises from those providing sustainable community transport to providing a supply chain for locally produced food.

2.2 Supporting grant applications

The Peak District National Park Authority supports farm businesses to take part in farm environment schemes with a strong sustainability/resilience strand. These schemes have sound land management practices at their core and improve the resilience of species and habitats. Many also contribute to the management of soil carbon. Despite reductions in the number and overall area of the park in such schemes, due to pending EU Common Agricultural Policy reform, approximately 78% or 1120km² of the Peak District National Park is covered by such schemes.

3. Advice and guidance

Please see section 4 of the main report for a summary of work on the Climate Change and Sustainable Building Supplementary Planning Document.

3.1 Planning policy, advice and guidance

The Authority's Planning Service provide pre-application advice to encourage high quality application submissions and outcomes that conform to planning policies and incorporate design measures which help to reduce the use of energy and generate renewable energy where possible. The Planning Service seek to develop exemplar cases of development exhibiting green energy credentials. They also attend and participate in conferences, seminars and advice sessions for the public.

The Planning Service is pro-actively engaged in the delivery of the "Climate Change and Sustainable Buildings" SPD. This is an ongoing action that is primarily achieved through the SPD to provide pre-application advice, to assess and determine planning applications, and to advise Members on these matters.

3.2 On Farm Energy, Efficiency and Renewable Project

Recent years have seen an explosion in the number of private companies offering advice and the installation of renewable energies, particularly in the farming press. Many farmers and land managers, particularly those who manage the smaller upland farms typical in the Peak District, are left feeling unsure, confused and reluctant to follow through and adopt new management and techniques.

Overall the Peak District is seen as an area where farmers and land managers are slow to adopt energy/water saving techniques and renewables. There seems to be nervousness about making planning applications and there is a perception that the Authority is not supportive of renewable energy development. Previous environmental economy programmes managed and delivered by the Authority have identified the benefits of advisor support in terms of the following.

- Encouraging businesses to look at both economic and environmental business outcomes.
- Building interest and confidence in new technologies and new ways of working.
- Demystifying the planning system.

This led to the development of the On Farm Energy, Efficiency & Renewable Project. The project was undertaken from June 2014 to November 2015. The scope of the project was to provide advice on the following.

- Energy reduction.
- Carbon management.
- Water saving.

- Waste management – plastics etc.
- Planning.
- Renewables advice and signposting.
- Grants/tariffs.
- Potential cost savings/income on a farm scale.
- Facilitation of priority actions within the context of a whole farm approach.

The key outputs from the project are as follows.

- 6 farm case studies - advisor support and facilitation has helped to develop environmentally sustainable farm businesses.
- 1 : many showcase event was held in November 2015 at the Agricultural Business Centre in Bakewell – 20 farmers, land managers, consultants and contractors attended.
- An adviser tool kit for mainstreaming this work and exploring future partial cost recovery for the service.
- Up-skilling of advisors who delivered the project and awareness raising across the wider team.

In terms of actual renewable energy technology put in place and/or planning permission achieved as a result of the advice and help, resulted in the following.

- Stoop Farm - ground source heat pump fitted; upgraded electrical supply to 3 phase to allow more efficient use of technology on the farm.
- Aston Hall Farm - solar panels installed - originally a 106kwp scheme which was increased to over 120kwp.
- Gateham Grange Farm - solar panels - planning permission obtained and panels to be installed shortly.

4. Property and estates management

Please see section 4 of the main report for a summary of work on our Carbon Management Plan.

5. Awareness raising and Education

Building connectivity through education and awareness raising is fundamental to our success in the above programmes and within dedicated education projects and programmes. Education and communication are principal tools in managing many of the factors affecting the Peak District National Park special qualities and in promoting the public's enjoyment of them. Our programmes and messages incorporate climate and carbon management and all ongoing and developing large scale funding bids have awareness raising and education built into them.

We record direct contact with around a million people a year directly through the following work.

- Education work with schools colleges and the general public.
- Guided walks and other outreach activities.
- National Parks visitor Information and cycle hire centres.
- Events and activity programmes.
- Website, web based communication and other publications.

We raise awareness of options to travel to Learning and Discovery Team events and day visits by public transport. An example is that we have been working with the Community Rail Partnership on a booklet for schools that promotes visits by train, on the Hope Valley line and Manchester to Hadfield line. Also targeting promotion of visits to Longdendale Environmental Centre to schools that can travel by train, meeting the group and running the day from Hadfield Station.

The Moorland Indicators of Climate Change Initiative (MICCI) project aims to raise awareness of carbon management in secondary schools. The project works across UK National Parks many of which incorporate large areas of upland and lowland peat moors. Students chose experiments which test hypothesis developed from two linked questions: *Are upland moorlands storing carbon (good for climate change) or releasing carbon (bad for climate change)?* And then go out into the moorlands to collect data. Data collected is analysed by the Moors for the Future science team (see section 4.1.1) as part of their ongoing research into moorland conservation management.