

# Engaging children on the autistic spectrum with the natural environment: Teacher insight study and evidence review

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# Foreword

Natural England commission a range of reports from external contractors to provide evidence and advice to assist us in delivering our duties. The views in this report are those of the authors and do not necessarily represent those of Natural England.

## Background

This report combines the evidence and insight research collected by Autism and Nature, under the direction of Kings College, London, on the benefits of engaging children on the autistic spectrum with the natural environment. The information will be used to help implement Natural England's Outdoors for All programme.

The Government's Natural Environment White Paper (2011) aims to strengthen connections between people and nature. However it acknowledges that the opportunities to benefit from spending time in the natural environment are currently not open to everyone, which can contribute to health and other inequalities. So the Government's ambition, set out in the White Paper, is that 'everyone should have fair access to a good quality natural environment'.

Natural England is committed to increasing the number and range of people who can experience and benefit from the natural environment and is championing Outdoors for All on behalf of Government and the natural environment, greenspace, volunteering and heritage sectors by working with partners to help improve the quality of everyone's experience of natural places and to increase the number and diversity of people inspired by and enjoying the natural environment.

Through the Outdoors for All programme Natural England is working closely with a range of partners to help deliver projects which seek to ensure that people living in deprived areas, the elderly, those with physical disabilities, mental health illness, learning difficulties and people from black, Asian and minority ethnic communities all have opportunities to access high quality natural environments (BURT *et al.*, 2013).

As part of the Outdoors for All programme Natural England is keen to better understand the evidence and priorities to help improve engagement in the natural environment amongst children with autism. There is a growing body of literature describing the benefits of nature for children's health and well-being. Whilst there has been some work with children with mental health problems, there have been very few studies with children on the autistic spectrum. In a recent study in Kent by Autism and Nature, children with autism from special schools were taken on visits to the countryside, with positive outcomes reported for many children, even after just one or two visits (Blakesley and Payne, 2012). However, it was apparent that there is generally a lack of opportunities for children with autism to use their local natural environment; that more work is required to thoroughly evaluate the benefits of such experiences for these children; and that there is a need to develop a clearer understanding of how such visits should be managed for children with differing levels of autism. The study described in this report should help to better understand the effectiveness of current practice and the challenges of scaling up delivery.

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**Further information**

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### **Autism-specific Schools**

Broomhayes School and Children’s Centre (National Autistic Society), Bideford, Devon  
Eagle House School, Mitcham, Surrey  
Grange Park School, Wrotham, Kent  
Helen Allison School (National Autistic Society), Meopham, Kent

### **Special Schools**

Corley Centre, Corley, West Midlands  
Fordwater School, Chichester, West Sussex  
Palatine Primary School, Worthing, West Sussex  
Ridgeway School, Warwick  
The Lindfield School, Eastbourne, East Sussex  
Torfield School, Hastings, East Sussex

## **Executive Summary**

This report presents the results of two studies on the benefits of engaging children on the autistic spectrum with the natural environment. The first is an Insight Study of 10 teachers and school leaders in different types of special schools catering for autistic students. The second is an Evidence Review which synthesised findings of published studies, drawing out the implications for policy, practice and future research in the area of autistic children and the natural environment.

The report examines views about the current status and benefits of engaging autistic children with the natural environment, and ideas about the future development of such work in connection with a possible Demonstration Project.

## **Main Findings**

The Insight Study found that:

- There were clear differences in the degree of engagement with the natural environment between schools, due to a range of enabling and constraining factors. These included: leadership; student need and enjoyment; staff confidence, enthusiasm and risk; curriculum opportunities and assessment pressure; expertise and inspiration from others; supporting resources and cost; and, access to local green space. Student need and enjoyment had particular significance due to the specific needs and capacities of autistic children.
- The most compelling benefits of outdoor learning for autistic children were: supporting the curriculum (bringing the curriculum to life); skill development (social skills and well-being); and personal, social and health education.
- All interviewed teachers felt that staff and students in their school would be keen to have more engagement with the natural environment, although important challenges were identified, including curriculum and assessment pressure and demands on staff time; concerns over the level of knowledge of some members of staff; and identifying suitable outside facilitators to support engagement programmes with the natural environment.
- Interviewed teachers would support a Demonstration Project that could: provide staff training and support; enable collaboration with outdoor learning providers; and encompass the broad range of autistic needs and potential benefits.

The Evidence Review highlighted the following:

- The current evidence on the benefits of engaging children on the autistic spectrum with the natural environment is very limited.
- Some small-scale studies however have been undertaken on outdoor activities with autistic children (e.g. animal therapy, gardening projects, summer camps, field visits). Useful

insights can also be drawn from wider but related literature (e.g. studies of outdoor learning with children in general, and work with children with Special Educational Needs (SEN), disabilities and Attention Deficit Hyperactivity Disorder (ADHD)).

- Current evidence, though limited, suggests that engagement with the natural environment can be beneficial for children on the autistic spectrum. This reflects the fact that: (i) there is strong evidence that outdoor activities can benefit children in general; (ii) there is considerable evidence that outdoor learning is particularly helpful for children with SEN who often face more difficulties with classroom learning and greater barriers to accessing the outdoors; and (iii) there is some evidence showing autistic children benefiting from initiatives such as gardening projects, summer camps, field visits and animal therapy.

## **Recommendations**

The two studies suggest the development of a Demonstration Project with special schools for autistic children should:

- **recognise the potential benefits for children on the autistic spectrum of engaging with the natural environment, taking note of the fact that there are clear differences between schools in terms of the degree of engagement with the natural environment;**
- **be encouraged by the enthusiasm expressed by all of the interviewed teachers for expanding their current programmes of engagement with the natural environment, and for the idea of developing a Demonstration Project;**
- **recognise that a Demonstration Project needs to develop a sustainable, evidence-informed model to help schools develop their own engagement programmes in the future;**
- **ensure that any Demonstration Project considers the requests by teachers for: more training and support for school staff, collaboration with external outdoor learning providers, and a broad focus on the full range of autistic needs and potential benefits;**
- **pay careful attention to the mix of challenges and opportunities facing staff in special schools catering for autism; particularly the real differences between schools (and between classes within schools) in terms of the severity of autism exhibited by students; and**
- **take note of the need for improved research-based insights into autistic children and their outdoor learning in the natural environment; particularly in relation to the activities and settings that are most appropriate for different kinds of learners, right across the autistic spectrum.**

## **Part 1**

### **School Leader and Teacher Insight into Engaging Children on the Autistic Spectrum with the Natural Environment**

This document reports on a study of 10 teachers and school leaders in different types of special schools catering for autistic students. It focuses on their views about the current status and benefits of engaging autistic children with the natural environment; and their ideas about the future development of such work in connection with a possible Demonstration Project.

#### **Main Findings**

##### **Views on the Current Provision of Outdoor Learning**

- Clear differences were evident between schools in terms of the degree of engagement with the natural environment, although almost all schools were doing some kind of outdoor learning. Some schools had well-developed programmes, while others were moderate, developing and, in one case, very limited.
- Respondents reported a number of enabling and constraining factors including a familiar range of influences. These included: leadership; student need and enjoyment; staff confidence, enthusiasm and risk; curriculum opportunities and assessment pressure; expertise and inspiration from others; supporting resources and cost; and, access to local green space. Student need and enjoyment had particular significance due to the specific needs and capacities of autistic children.
- Three compelling benefits of outdoor learning for autistic children included: supporting the curriculum (bringing the curriculum to life); skill development (social skills and well-being); and personal, social and health education.

##### **Views on the Future Development of Outdoor Learning**

- All interviewees expressed an opinion that staff and students in their school would be keen to have more engagement with the natural environment.
- Interviewees highlighted several challenges to developing more outdoor learning, including curriculum and assessment pressure and demands on staff time; concerns over the level of knowledge of some members of staff; and identifying suitable outside facilitators to support engagement programmes with the natural environment.

##### **Views on the idea of a Demonstration Project for special schools for autistic children**

Interviewees would support a Demonstration Project that could:

- provide training and support for special school staff;
- support collaboration with external outdoor learning providers; and
- take a broad focus on the full range of autistic needs and potential benefits.

## Recommendations

Those involved in making plans for the development of a Demonstration Project with special schools for autistic children should:

- **recognise the significant benefits for children on the autistic spectrum of engaging with the natural environment.** Special school staff interviewees were keen to highlight benefits in terms of developing social skills and well-being; personal, social and health education; and enhanced curriculum learning.
- **take note of the fact that there are clear differences between schools in terms of the degree of engagement with the natural environment.** While some schools have well-developed provision in certain contexts, others have only moderate or developing outdoor learning programmes, and, in one case, use of the outdoors was very limited.
- **be encouraged by the enthusiasm expressed by all of the interviewees for expanding their current programmes of engagement with the natural environment, and for the idea of developing a Demonstration Project.** Despite the differences in current provision, all schools, including those which were considered to be ‘well developed’, were extremely keen to do much more.
- **respond to the requests for: more training and support for school staff; collaboration with external outdoor learning providers; and a broad focus on the full range of autistic needs and potential benefits.** It is particularly important that any future Demonstration Project seeks creative combinations between the expertise of special school staff (how to work with autistic learners) and the expertise of outdoor educators (how to facilitate learning in natural environments).
- **pay careful attention to the mix of challenges and opportunities facing staff in special schools catering for autism.** Significant challenges arise from the fact that there are real differences between schools (and between classes within schools) in terms of the severity of autism exhibited by students, and hence their special needs and their ability to learn. There are also important opportunities in working with special schools for autistic children, such as strong recognition of the importance of varied learning environments and the need for more creativity in the curriculum.
- **recognise that a Demonstration Project needs to develop a sustainable, evidence-informed model to help schools develop their own engagement programmes in the**

**future.** There has been very little research or development into how to effectively engage autistic children with the natural environment. Consequently little is known about the activities and circumstances that are most appropriate for these kinds of learners, and systematic evidence on the benefits in terms of learning, social skills and well-being is rare. It is important for a Demonstration Project to address such gaps.

# 1. Introduction

## 1.1 Background

This study into teachers'/school leaders' views on the engagement of autistic children with the natural environment appears in connection with a number of wider developments. It comes against the backdrop of the Natural Connections Demonstration Project (2012-15), which aims 'to reconnect children with their local natural environments by stimulating both the demand for and the supply of services to support learning outside the classroom in natural environments' (Natural England, 2012, p. 3). It also builds on previous Natural England research into various aspects of 'learning outside the classroom in natural environments', including: a synthesis of the evidence on the benefits and barriers to such learning (Dillon & Dickie, 2012); and an investigation into school leaders' and teachers' views of current provision and possible future development of outdoor learning in different types of schools nationally (Rickinson et al., 2012).

Furthermore, this study (and its accompanying literature review) can be seen as a response to a number of wider issues and concerns, including:

- the urgent need, as set out in the 2011 Environment White Paper, to address the growing disconnection of children from the natural environment (DEFRA, 2011);
- the beneficial role that learning activities in natural environments can play, but the barriers and local challenges that can limit outdoor learning in some schools (Dillon & Dickie, 2012);
- the particular relevance of outdoor learning for children with special educational needs (SEN) who, along with other groups, can struggle with classroom-based learning (Rickinson *et al.*, 2012)
- the clear need for more and better research evidence into autistic children and their outdoor learning in the natural environment (Blakesley and Payne, 2011).

Whilst there has been some work with children with mental health problems, and children in disadvantaged areas, there have been very few studies with children on the autistic spectrum. Furthermore, it seems apparent that barriers to accessing the natural environment remain, particularly for the more vulnerable sectors of society. This current study was therefore initiated to be able to involve direct feedback from special school staff involved in working with autistic students.

## 1.2 Aims

This research examined the needs of staff in different types of special schools for children on the autistic spectrum, in relation to engaging their students with the natural environment. More specifically, the study aimed to provide up-to-date research-based insights into:

**(i) Views on the current status of engaging autistic children with the natural environment** – teachers’ descriptions of their schools’ current outdoor learning programmes, and the factors which enable and constrain such work;

**(ii) Views on the benefits of engaging autistic children with the natural environment** – teachers’ perceptions of different benefits of outdoor learning for children on the autistic spectrum; and,

**(iii) Views on the challenges and opportunities for future development** – teachers’ ideas about the challenges and opportunities of expanding their current outdoor learning programmes and how a future Demonstration Project might help them to achieve this goal.

### **1.3 Methods**

The findings presented in this report are based primarily on qualitative data generated through telephone interviews with school staff. Individual, semi-structured telephone interviews were undertaken with 10 teachers and school leaders in different types of special schools catering for autistic students. More details about the nature and selection of these schools are presented below. The main purpose of the interviews was to enable school staff to speak openly about the issues listed above under ‘Aims’. These staff had varying levels of experience of engaging autistic children with the natural environment, and worked with children with a wide range of autism and related conditions.

The selection process was primarily driven by a desire to achieve a sample of 10 teachers in different types of special schools, including National Autistic Society (NAS) schools, private and statutory autism-specific schools, and local authority schools with specialist provision for children with autism. To achieve this sample, documentary analysis was undertaken, studying relevant school documentation such as websites, Ofsted reports, and information on 78 autism-specific schools, and special schools with autism accreditation, supplied by the NAS. Sixteen schools were contacted to see if they wished to take part in the study. Of those, ten agreed to take part and nominated either a member of the senior leadership team or a classroom teacher.

The characteristics of the achieved sample of 10 teachers (Figure 1.1) shows that, within the limits of what is possible for such a small sample, there is a reasonable degree of variety in terms of school designation, age range (primary/secondary) and school settings. There was also a good degree of variety in terms of the severity of autism spectrum disorder (from severe learning difficulties to high functioning autism), and in terms of the academic abilities of the students at the sample schools.

Another factor driving the sampling process was the desire to interview teachers in schools with varying levels of student engagement with the natural environment, including schools with little or no current provision. Difficulties were encountered in identifying the level of provision

before schools were actually selected. Such difficulties are in accord with an earlier Insight Report on Learning Outside the Classroom in Natural Environments (Rickinson et al., 2012). It was therefore not possible at the sampling stage to identify schools with differing levels of provision.

## **1.4 Report structure**

The remainder of the report is in three sections. Section 2 considers interviewees' views on their school's current engagement programmes with the natural environment and the factors that enable and constrain such work. Section 3 then examines interviewees' views on the idea of doing more outdoor learning with their autistic learners, what challenges might be presented by this prospect and how a Demonstration Project might help to overcome such challenges in the future. The report concludes with a series of recommendations for a future Demonstration Project focused on autistic children's engagement with the natural environment (Section 4).

**Figure 1.1: Characteristics of Participating Schools and Teachers (n=10)**



## 2. Views on the Current Provision of Outdoor Learning

This section reviews what interviewees thought about their schools' current provision for outdoor learning with autistic students, and the factors which enable and constrain these kinds of activities. It also outlines teachers' perceptions of the benefits of outdoor learning for children on the autistic spectrum.

### 2.1 Views on current outdoor learning activities

The teachers and school leaders who took part in this study were asked to describe the various types of engagement with the natural environment currently happening in their schools. Their responses help to highlight a number of key messages.

**Firstly, the degree of engagement with the natural environment varies between these special schools for autistic children**, although all of the schools were active in some areas. The extent of activities in the three different settings – school grounds, local green space and more distant green space – varies considerably between the schools. As can be seen in Figure 2.1, most of the 10 schools in this study are undertaking outdoor learning activities with their students in one or more of the three settings. Only one secondary school was considered to have very limited engagement with the natural environment in all three contexts; this school had limited grounds and no green space within walking distance, and visits to more distant green space were infrequent.

**Figure 2.1: The extent of engagement with the natural environment across the schools**

<p><b>Well-developed engagement with the natural environment in two or more contexts</b> 4 schools</p>	<ul style="list-style-type: none"> <li>• This category included two all-age National Autistic Society schools, and two secondary schools</li> <li>• One secondary school had a very well-developed enrichment programme timetabled weekly, with developments in other areas such as Forest School; it was clear from the school improvement framework that outdoor learning was central to whole-school ethos and vision</li> <li>• Three other schools had a well-established provision for engaging their children with the natural environment</li> </ul>
<p><b>Well-developed engagement with the natural environment in one context</b> 3 schools</p>	<ul style="list-style-type: none"> <li>• In this category were two primary schools and one all-age school, with well-established activities in their grounds or local green space</li> </ul>
<p><b>Developing or moderate engagement with the natural environment in one or more contexts</b> 2 schools</p>	<ul style="list-style-type: none"> <li>• The examples here are two primary schools; one with extensive grounds, the other with very minimal grounds</li> <li>• In one school, it was apparent that, for some classes, engagement programmes were well developed, while other classes had far less access to the natural environment; in the other case, more emphasis was placed on the use of animals, with some very significant benefits</li> </ul>
<p><b>Very limited engagement with the natural environment in all three contexts</b> 1 school</p>	<ul style="list-style-type: none"> <li>• The one example in this category was a secondary school with limited school grounds, which had less impetus to initiate activities off-site than other participating schools</li> </ul>

**Secondly, there are also considerable differences in the extent to which different outdoor learning spaces (school grounds, local green spaces, and distant green spaces) are being used by the schools. School grounds** differed widely in area, facilities and use (Figure 2.2). With the exception of two schools with limited opportunities, all schools had either well-developed programmes for using the school grounds, or these programmes needed further development. Activities and facilities in school grounds included sensory areas, outdoor classrooms, horticultural areas, gardens, ponds and conservation study areas, shaded areas for contemplation and stories, minibeast areas to support science and physical education (PE). One secondary phase school had a very clear vision of how it wanted to sustainably develop the use of the school grounds to support the curriculum and enhance the students' learning experiences. By contrast, one primary phase school had developed a range of facilities including a sensory garden and a horticultural area with outside support, but this had not proved sustainable when the support ended, although at least one member of staff in the school recognised that help was needed to reinvigorate its use of the school grounds.

**Local green space** was likely to be used if it was accessible and suitable for children with autism. Six of the schools had well-developed programmes for utilising their nearby green areas, while the other four reported having no suitable green space locally. The impression from interviewees' comments is that local factors (such as the availability of nearby green space and the confidence and competence of staff) can explain much of the differences in local outdoor learning activities both between and within schools. Indeed, there may be significant differences in the amount of engagement with the local natural environment that a child receives in a given school, depending on the class teacher.

All schools take students on visits to more **distant green spaces**, although this provision varies considerably between schools, both in terms of frequency and destination. Only three of the schools are considered to have well-developed programmes; five had moderate or developing programmes (including all of the primary schools); and two reported only limited use of more distant green space. Activities included half-day or day trips to natural places such as nature reserves and country parks, led by the teachers; visits to nature reserves hosted by facilitators such as VisitWoods and Wildlife Trust staff; regular visits to stables; and residential visits to Outward Bound centres.

Overall, then, it is clear that provision for engaging with the natural environment varies between schools, and in many cases within schools, offering clear opportunities to do more. Indeed, all interviewees commented that that their school would be interested in enabling more engagement with the natural environment (see further discussion in Section 3.1).

**Figure 2.2: The extent of engagement with the natural environment across different contexts**

<p><b><i>Within school grounds</i></b></p> <p><b>Activities in the grounds were well-developed in three schools, and developing in five others.</b></p> <ul style="list-style-type: none"> <li>• School grounds varied enormously in terms of size and area and facilities across the schools</li> <li>• Main activities were supporting the curriculum, accessing sensory gardens, providing opportunities for children to relax, calm down, have picnics, do growing activities, explore conservation areas, learn in Forest School areas</li> <li>• Three schools had well developed engagement programmes, five were moderate or developing</li> <li>• Most schools used their grounds to some extent; main barrier for two schools was lack of space</li> <li>• Several schools highlighted staff as both a key enabler (enthusiasm/interest) and a barrier (e.g. lack of knowledge/interest, confidence or inspiration) within their schools</li> <li>• One teacher commented that “Teachers who have recently joined the school tend to stick to curriculum planning... they may be less comfortable and confident teaching outdoors”</li> </ul>	<p><b><i>In local green spaces</i></b></p> <p><b>Activities were well developed in six schools, with no suitable space available in four others.</b></p> <ul style="list-style-type: none"> <li>• In the context of this survey, local green space was viewed as places which classes can walk to, or places which are a short minibus ride away</li> <li>• Several ‘rural’ schools used local footpaths; others used local parks and in one case, the sports field of a local mainstream school</li> <li>• Schools highlighted staff as both a key enabler (enthusiasm/interest) and a barrier (e.g. lack of knowledge/interest, confidence or inspiration) within their schools</li> <li>• Barrier for four of the schools with clear lack of suitable local green spaces; in one case it was too dangerous (road and other safety issues) to walk to the park; in two cases, local park facilities were run down and unsuitable for autistic children; and in the case of one rural school, no suitable green spaces had been identified</li> <li>• Transport was a barrier for several schools</li> </ul>
<p><b><i>More distant green spaces</i></b></p> <p><b>Trips involving minibus travel were well developed in some schools, but limited in others.</b></p> <ul style="list-style-type: none"> <li>• Visits varied from trips of short duration, to full days and residential trips</li> <li>• Three schools had well developed programmes, five were judged to be moderate or developing and two were limited</li> <li>• Several schools off horse riding</li> <li>• Few trips are hosted by outside facilitators</li> <li>• Frequency of visits (enablers) depends on a wide range of factors, e.g. age/needs of particular classes and students; school policy; opportunities to support the curriculum; confidence and vision of staff; transport; availability of established learning space and external facilitators who understand autistic children</li> <li>• Barriers include: curriculum time pressure; staff may lack enthusiasm and knowledge to lead trips to natural places; entry costs; availability of drivers; availability of established learning space and external facilitators who understand autistic children; some children already have long taxi journeys to school; knowing what is available</li> </ul>	<p><b><i>National schemes</i></b></p> <p><b>There was limited involvement with national schemes relating to engaging children with the natural environment.</b></p> <ul style="list-style-type: none"> <li>• Five interviewees were unaware of any national schemes relating to engaging with the natural environment in their schools</li> <li>• Schemes mentioned by other schools, but which appeared to be low key in some cases, included Sussex in Bloom, Eco-schools, Trim Trails, Duke of Edinburgh awards, and Grow-to-eat.</li> </ul>

## **2.2 Views on the factors that enable and constrain outdoor learning**

When asked about the factors that enable and constrain engagement with the natural environment, interviewees tended to respond in quite general terms. However, across the schools it is possible to identify a number of themes that encompass a mixture of positive enablers and negative barriers. Several of these themes echo influences that have been reported in earlier Natural England/King's College London studies, such as 'school leadership', 'expertise and inspiration from others', and 'access to local green spaces' (see Rickinson et al., 2012). In addition, some of the themes reported here reflect the particular needs of children with autism and related conditions. For example, in relation with 'student need and enjoyment' the interviewees in this study emphasised the special relevance that certain aspects of outdoor learning have for autistic children and young people. All of the themes discussed below have clearly influenced the development of engagement programmes with the natural environment, both positively and negatively.

### **School leadership**

The six senior leaders interviewed had a positive attitude towards increasing the level of engagement of their students with the natural environment, although some expressed this more strongly than others. Two of the four teachers interviewed also expressed the view that their head teachers were supportive. Furthermore, all interviewees indicated a strong desire to increase the amount of engagement with the natural environment, irrespective of their current level of activity. Indeed, one head teacher was keen to emphasise that included in the School Improvement Framework was 'Enhance students' learning experiences by providing greater opportunities for learning outside the classroom'.

### **Student need and enjoyment**

Although not stated explicitly in answer to the question about enablers, it was clear that meeting the distinctive needs of autistic learners was implicit in much of the outdoor learning reported by the interviewees. The majority of interviewees appreciated how the natural environment offers considerable benefits to their students in a wide variety of ways, and this issue is discussed further below (see Section 2.3 and Figure 2.3). One NAS school interviewee commented that 'We like our children to see things *in situ*, rather than just being told about them, and we like to do a lot of hands-on stuff and practical things [outdoors]'. Another teacher commented that:

Some children that don't get on well in the classroom, will concentrate much better if taken outside, perhaps to sit on a bench to work – fortunately we have the staff to take some children outside during lessons.

A strong endorsement came from one primary school head teacher:

What I have found working with autistic children is that they just are different when you take them into nature, to how they are in a classroom. When we are in school, it's very contrived, and they know they will have to do things that they may not be very comfortable about doing, but when they go into nature e.g. woods or fields I think they feel much more relaxed, they seem to understand the environment, they feel more comfortable – maybe because they are much freer to roam and explore, and to be involved in the sensory aspects of nature.

Commenting on older children, the head teacher of a secondary phase school stated that:

In terms of social skills, it is vital that they [the Key Stage 4 Life Skills students] get out and have a go at things – it helps them to become less reliant on adult support, they are significantly less anxious in a low stress environment, gain confidence in their own ability by doing things for themselves, behaviour [outside] is always excellent, and this transfers to the classroom when they get back in... notable difference in their behaviour when they have to write about an activity back in the classroom... their experiences promote independence and they learn about hazards and risks which they may take into adult life... can and often does enhance their social skills and encourages empathy – start to form bonds and cooperate with their peers – communication and relationships with adults always improves significantly when they go outside... it promotes self awareness, develops team building, team working, leaderships and respect for others in the group.

A senior teacher from an autism-specific school had a similar view:

Staff see the natural environment as a valuable opportunity for the students, especially as many are sat behind a classroom desk for much of the time, being out of the classroom in the natural environment is much more beneficial for all our students, even for our lower ability students. Certainly the access to open spaces for some students to get rid of their arousal levels to have opportunities to explore and not have the confinements of the walls or the expectations of some of the rules we have are vitally important.

### **Staff confidence, enthusiasm and risk**

Having staff who are enthusiastic and committed to engaging students with the natural environment was seen as a very important enabler by every interviewee. One NAS school interviewee highlighted the importance of enthusiastic staff who are experienced and aware of the communication needs of the individual students. The teacher added a further enabler, that there is a need for staff to work hard to socially integrate students into society whilst they are outdoors. One secondary phase school head teacher commented that 'a lot of it [engagement with the natural environment] is down to staff, with certain staff being really keen and looking for opportunities all the time to get the students outside'. In this particular school, two

members of staff were being trained in Forest School, with the expectation that these staff will train other members of staff, and start to roll out a programme.

However, whilst being a strong enabler, staff can also constitute a considerable barrier. One primary school teacher with many years of experience, referring to colleagues, commented that:

older and more experienced special school teachers have more confidence and the vision to see how the outdoors can be used to do things much better, and appreciate the benefits for the children... teachers [from mainstream] who have recently joined the special school tend to stick to curriculum planning and may be less comfortable and confident teaching outdoors.

Staff concerns over risk assessments were mentioned by several schools as a barrier to engaging students with the natural environment. One secondary school head teacher commented that risk assessment for children with special educational needs and the paperwork which this generates is a significant factor which puts some teachers off. However, the use of online assessment tools such as EVOLVE, and risk assessments provided by some venues was highlighted by several schools as helpful in this process. Several interviewees commented on the lack of awareness of dangers by some children with autism, e.g. it would be too dangerous to walk down the road with children who have no awareness of the dangers of running into the road, or who might run away at the sight of a dog. One head teacher commented that there was a risk that some children might abscond.

### **Curriculum opportunities and pressure**

Despite the pressure to deliver on the core curriculum, the comments of interviewees from seven of the schools clearly indicated that a desire to increase creativity within the curriculum could also be a significant and positive enabler (see Section 2.3 and Figure 2.3). One primary school head teacher commented that ‘the most compelling reasons for [engaging with the natural environment] are those which help to develop the children’s learning; we want the curriculum to be creative, but we also want to help the children to make the best possible progress, because the school is measured on the success of the curriculum’. A teacher at an all-age school went further, stating ‘sometimes the constraints of the National Curriculum have to be abandoned, particularly for severe children [with autism]’.

One secondary phase special school head teacher described how ‘enhancing their student’s learning experiences by providing greater opportunities for learning outside the classroom was central to their ethos and vision’. In this school, the head teacher commented that ‘all subject leaders have recently done an action plan and a lot of them have identified the fact that there needs to be greater opportunities to take our students out into the grounds’, adding that ‘classes do not go out just because it is a nice day, as may have happened in the past, now it has to be part of the planning’.

However, curriculum pressure was also raised by some interviewees as a constraint to engaging with the natural environment. One secondary school interviewee commented that whole day trips are fine every now and again, but children will miss other lessons. The interviewee added that for a more regular weekly activity, visits would have to be closer to the school, to fit within two 45-minute lessons. One secondary school head teacher commented that ‘Now that we are getting more secure about achieving our levels for English and Maths, we are starting to look at developing other areas of the curriculum in order to broaden our delivery... looking at the Arts and vocational courses’.

### **Expertise and inspiration from others**

The importance of ideas, inspiration and resources to support engagement of children with autism in the natural environment was a theme which was raised by many interviewees, at various points of their interview conversation. Seven interviewees commented on their concerns that colleagues lacked the knowledge, and/or confidence to undertake meaningful experiences for autistic students in the natural environment, thus identifying a clear need for support (see Section 3.2). Having places to visit where facilitators could host sessions, and introduce new activities to both the students and teachers was also seen as important by many interviewees (see Section 3.3). Special schools experience problems in finding outside organisations able to provide facilitators to host visits. Furthermore, external facilitators are not generally aware of, or trained to adapt activities for classes of students with autism, particularly those with more severe difficulties. Exchange of expertise, through programmes of visits to outside organisations for example, would be particularly beneficial for students with autism, enabling exchange of information between teachers and external facilitators.

### **Supporting resources and cost**

On the whole, interviewees did not view numbers of staff required to accompany children on trips to be a barrier, with just one interviewee commenting that the school did not have sufficient teaching assistants to accompany visits offsite. None of the interviewees mentioned the need for additional adults, such as parents or volunteers to support outdoor visits, possibly because most tend to have higher staff student ratios than mainstream schools.

Transport, however, was often mentioned as a barrier, either due to minibuses being booked or there being not enough drivers. One primary phase teacher commented that the classes which tend to go out are the ones which are taught by a teacher able to drive the minibus. However, another primary phase teacher commented that ‘every class is allocated use [of a minibus] for at least one slot each week to practice social skills, or link into a particular curriculum topic; and yet some teachers just don’t take their children out (not really sure of the reasons for this); personally I think this is the best part of the week’.

A further barrier related to transport reflects the catchment areas of many of special schools. These catchments can cover large areas, often a whole county, which means that some children

already travel considerable distances, and may spend two hours or more in a taxi each day. For these children, further travelling would be best kept to a minimum. Most special schools have several minibuses, although running costs are becoming prohibitive in some cases. However, one primary phase school had no minibuses of its own. One interviewee from an all-age school said that more outdoor engagement could be achieved if the school had more transport available – in this case minibuses were quite committed to work experience and taking older students to college.

There was no clear pattern on the views of interviewees on the availability of information on places to visit away from the school grounds and local green space. Some interviewees stated that information on places to visit and services offered, such as facilitated sessions on woodland animals or pond dipping was readily available, if staff knew where to look. Others commented that they were rarely contacted by outside agencies such as the Wildlife Trusts, and were unaware of what might be on offer locally. One head teacher commented that the school received a lot of information by post and email, and that this could easily be lost in the system, depending on who the information was sent to, how busy that person was at the time, and whether it was forwarded to colleagues likely to respond. Costs, such as entry fees to nature reserves or for facilitated sessions were also reported to be prohibitive in some cases (and rising) by two special schools, and one NAS school interviewee commented that host organisations do not always understand the needs of children with autism, and may try to give inappropriate guidance.

### **Access to local green space**

Access to school grounds and local green space was clearly an enabler for most schools, for example 'We have a covered gazebo for picnics; two hard surfaced adventure playgrounds; cycling playground; sensory garden and horticultural garden with raised beds and a poly-tunnel; also small area of trees with totem poles which is a nice sensory area... and a variety of local walks - access to public footpaths onto farmland is just five minutes walk from the school'. Another head teacher of a secondary school described extensive, spacious open grounds, with grassy areas and trees, looking out onto pasture with cattle. The grounds also include a greenhouse and raised beds/garden area, outdoor play equipment, a football pitch and tennis court. This school was actively developing their grounds for outdoor learning, including: a woodland classroom; a living willow hedge; and a 'living' willow shelter which their pupils would be able to help to build and watch grow, and use for outdoor lessons such as maths and English. The school also has access to local walks and a local park.

Such facilities are not available to all schools, and there were several examples where a lack of space within school grounds, or within the local area appeared to be a real constraint. For example a secondary school head teacher stated that 'we have very limited grounds, comprising a playground and small vegetable plot... and no local green space' and a primary school teacher described a lawn to the front of the school with flower beds, on a busy main road, and local parks which are rarely if ever visited, because of dangerous roads. It is possible that if schools do not engage their children regularly with the natural environment in grounds

or local green space, that they are less likely to recognise the benefits of visiting more distant green space.

### 2.3 Views on the benefits of outdoor learning for autistic children

Interviewees were presented with a list of six benefits of engaging autistic children with the natural environment, and asked to comment on which ones they found most compelling from the perspective of their students. The responses that were received (a selection of which can be seen in Figure 2.3) highlighted the following trends:

- Outcomes to do with **‘supporting the curriculum’** (in terms of outdoor learning bringing the curriculum to life for autistic learners) were specifically mentioned by staff in seven schools. These schools included one all-age school whose teacher stated that the curriculum became more important for older children at secondary level, and a secondary phase school which had a school development priority of ‘promoting spiritual, social, cultural and moral development’ that included enhancing students’ learning experiences by providing greater opportunities for learning outside the classroom. There were three other schools that did not highlight the curriculum at all in answer to this question (they included two primary schools and one all age school).
- Benefits in the area of **‘skill development’** (social skills and well-being), and/or **‘personal, social and health development’** were highlighted by *all* of the schools as being particularly compelling. This finding reflects the importance to them of engaging children on the autistic spectrum with the natural environment to develop their social skills and to enhance their well-being. Staff in three schools also mentioned that support for their PSHE (personal, social health and economic education) programmes was also important, whilst another interviewee talked about ‘PSHE benefits’.
- Benefits to **‘vocational learning’** ranked among the most important for one autism-specific secondary school and one primary phase school. Another autism specific secondary school also highlighted vocational benefits, although it was not identified as one of their ‘most compelling’ benefits.
- Issues relating to **‘whole-school benefits and community links’** were low on the agenda for most schools. Just one head teacher commented on this issue (not as one of the most compelling reasons), pointing out that it was one of the priority areas for their school over the coming three years.
- Impacts around **‘teacher development’** were emphasised by several head teachers during the course of the interviews, but none identified this as a compelling benefit for engaging autistic children with the natural environment

Overall, seven of the interviewees felt that benefits relating to the **curriculum** were very important. Most interviewees also considered **personal well-being** as one of the primary benefits of engaging with the natural environment – helping children to relax, feel more comfortable with their surroundings and have heightened sensory experiences; this was generally associated with the development of **social skills**. **Personal, social and health development** was also important for eight interviewees, some of whom talked about the value of engaging with the natural environment for their PSHE programmes.

**Figure 2.3: Interviewees’ views on the different benefits of engaging autistic children with the natural environment**

<p><b>Supporting the curriculum</b></p> <p>“We like our children to see things <i>in situ</i>, rather than just being told about things with pictures.”</p> <p>“It makes what children are learning from a book/worksheet/PowerPoint, etc. ‘real’ – so they can actually relate what they are learning about to real life, which children with autism find quite difficult – brings the curriculum to life really”</p> <p>“The most compelling reasons for the school are those which help to develop the children’s learning; we want the curriculum to be creative, but we also want to help the children to make the best possible progress, because the school is measured on the success of the curriculum... so the curriculum element is very compelling for me.”</p>
<p><b>Social skills and well-being</b></p> <p>“For many of our children, improving their curriculum knowledge and skills is secondary to the need for us to be able to communicate with them, we need them to gain a sense of where they are in the world – for them to be engaged is absolutely key... to get them out, where they can have space to independently explore and search out things. For us, curriculum is almost secondary, so long as they are engaged, and we are developing them – and if activities have literacy or numeracy base, so much the better.”</p> <p>“Seaside they love – one girl with more severe autism for example, runs along the water’s edge, kicking the waves... very sensory things... those that need more sensory things like to go outside, touching things, and experiences like this.”</p> <p>“We also see a completely different side to the children in the nurture group for example when we take them out into the countryside – they are much more engaged and focussed on what they are doing [than in the classroom] and we are sometimes surprised about what they are able to do and their behaviour.”</p> <p>“What I have found working with autistic children is that they just are different when you take them into nature, to how they are in a classroom. When we are in school, its very contrived, and they know they will have to do things that they may not be very comfortable about doing, but when they go into nature e.g. woods or fields I think they feel much more relaxed, they seem to understand the environment, they feel more comfortable – maybe because they are much freer to roam and explore, and to be involved in the sensory aspects of nature.”</p> <p>“Skill development is also important, particularly social skills sitting in hides badger watching – being quiet in a different context – a really positive experience, you can hear they are excited because of the loudness of their whispering, but they are able to sit because they are expecting something new and exciting to happen.”</p>

### **Personal, social and health education (PSHE)**

“ASD group use [local green space] for activities to support PSHE such as road safety, awareness of other people, water safety, stranger danger; also go down to the park cafe for a drink or ice cream.”

“Engaging with the vast majority of children is incredibly difficult for us, so personal and social development is also very compelling for me – so if we can get them interested in things, then we have a chance of them learning. And for many of our children, we can do this more effectively outside, no doubt about it.”

“Developing relationships between peers and teachers is important, seeing them run through leaves and kick them up in the air, paddle in the sea – improves relationship.”

### **Vocational learning**

“Vocational skills are also very important, and could be helped by the natural environment, thinking about the progress of the students to Key Stage 5, and onto our new unit for over 18 year olds or preparing for the real world.”

“Skill development also very important for our children as the majority will not go on to higher education but the majority can and should be able to have meaningful and enjoyable life opportunities when they are older. The opportunity to develop skills involving gardening/horticulture is invaluable for them. For some it is also an important opportunity to work or engage in a ‘team’ situation which is often very difficult to achieve in a classroom setting.”

### **Whole school benefits and community links**

“All schools have to look at this, and it is one of our priority areas for the next 3 years - we need to look at this more and more.”

## **2.4 Summary of views on the current provision of outdoor learning**

- Clear differences were evident between schools in terms of the degree of engagement with the natural environment, although almost all schools were doing some kind of outdoor learning. Some schools had well-developed programmes, while others were moderate, developing or, in one case, very limited. Schools also differed considerably in the extent to which different outdoor learning spaces are being used. School grounds are being used to some extent by most schools, although only three were well-developed. Use of local green space was most well-developed, with more distant green space least well-developed.
- On the question of enablers and constraints, interviewees cited a familiar range of influences, such as: leadership; student need and enjoyment; staff confidence, enthusiasm and risk; curriculum and assessment opportunities and pressure; expertise and inspiration from others; supporting resources and cost; and access to local green space. Of these, though, ‘student need and enjoyment’ had particular significance due to the specific needs and capacities of autistic children.
- On the question of benefits of outdoor learning for autistic children, interviewees found three benefits most compelling: supporting the curriculum (bringing the curriculum to life); skill development (social skills and well-being); and personal, social and health education.

### **3. Views on the Future Development of Outdoor Learning**

The previous section looked at interviewees' views on their schools' current provision for engaging students with the natural environment. This section moves on to examine their views on the idea of organising more outdoor learning with their autistic learners, what challenges this might involve and how a Demonstration Project might help to overcome such challenges in the future.

#### **3.1 Views on the idea of developing more outdoor learning**

**When asked whether staff and students in their schools would be interested in engaging more with the natural environment, interviewee's responses were all extremely positive.** In explaining their enthusiasm, interviewees again highlighted the potential benefits of engaging autistic children with the natural environment. To quote one interviewee:

Definitely yes... staff are more likely to be inclined to be creative when out in the natural environment, I've no doubt about that. They think differently when they are out, they are more adventurous, and take more risks with the teaching, which is a good thing. And most children will generally be more engaged, many of our kids don't like being in a classroom, so taking them out increases the opportunities for learning... the more the better.

Along similar lines, another said:

Yes... because what they do already is so successful, that we want to continue and build on that. This would apply right across the school, especially to the lower ability children, although obviously we are a little bit more restricted in Key Stage 4 because of accreditation, but no reason why we couldn't look for accredited parts of the course which are to do with the environment, and making these more purposeful through accessing the natural environment as well.

For others, the idea of developing outdoor learning either fitted with their existing plans ('we want to increase engagement with the natural environment within the school grounds') or the current needs ('at the moment we are class-bound – we need to get out more').

Only two interviewees raised concerns – one was concerned that some colleagues are very 'curriculum driven' and lack the vision of more experienced special school teachers and a second mentioned transport and other logistical matters.

#### **3.2 Views on the challenges of developing more outdoor learning**

Interviewees were also questioned about what challenges their school would face if developing more engagement with the natural environment for autistic children. This question elicited a

broad range of responses, echoing some of the barriers highlighted earlier (see Section 2.2). Eight of the interviewees commented on **curriculum pressure, and demands on staff time**. For example ‘meeting needs of curriculum, and fear of Ofsted, feeling that teachers have to plan every minute of the day’ and ‘curriculum pressure – nowadays there are so many forms and targets to achieve, and “real meaningful experiences” cannot be quantified – even though teachers know how valuable these learning experiences are, there is no box to tick, no piece of data to show; we need to show more quantifiable stuff – this is a barrier’.

Five of the interviewees also commented on concerns over the **level of knowledge of their own staff** to deliver meaningful experiences for children in the natural environment. One primary school teacher commented that ‘teachers lack experience and imagination to use the natural environment’. Another also talked about the confidence of staff as ‘some teachers will just go and walk around, but others for example will do a lot of storytelling – trying to capture their [autistic children’s] imagination, trying to spark some excitement’. The head teacher of another primary school went into more detail ‘a key area is making sure our staff are supported, trained, and confident to deliver when out in the natural environment. The staff would know that they would have to work very hard at first to prepare for sessions in the natural environment, to deliver the curriculum. They would certainly want more training and support. So the school needs the skill set to enable them to develop it’.

Connected with concerns about the competence of school staff were **problems with finding suitable outside facilitators** to support such engagement programmes. One senior teacher from a specialist school for autism was concerned that other professionals should be aware of the difficulties of students with more severe autism, and have time to build relationships, a point made earlier by another specialist school. Another head teacher emphasised how off-site provision only works well for students and staff when the facilitators are high quality: ‘We do take the children to sites where there are facilitators who are trained to deliver terrific learning opportunities, great with the kids – then our staff go and work with them, and it is a win-win for us. Staff get ideas also. This is the key point – facilitators – win-win... everybody benefits – children happy and staff enthused. It is expensive though’.

### **3.3 Views on the idea of a Demonstration Project for special schools for autistic children**

Interviewees had many ideas about how a Demonstration Project could help special schools catering for autistic students. **When asked whether such a project would be of interest to their school, most answered emphatically Yes, or definitely Yes.** The two quotes below are illustrative of interviewees’ responses:

I think this is a very interesting piece of work. We are massive fans of looking at the ‘whole child’ – not just the academic achievement. If we could help out I am sure we would be delighted.

Definitely. I feel passionate about using the environment, another thing we can get our kids to take a bit of responsibility for, and appreciate more.

In terms of how a Demonstration Project involving schools for autistic children might work and what it might focus on, interviewees put forward a range of different ideas. These ideas can be summarised around three main messages. These emphasise the need for any future Demonstration Project to include:

- training and support for special school staff;
- collaboration with external outdoor learning providers; and,
- a broad focus on the full range of autistic needs and potential benefits.

### **Training and support for special school staff**

There was a strong desire from seven of the interviewees for support and training to address weaknesses in staff skills, knowledge and confidence. In particular, there were calls for in-service training around:

- **appropriate learning activities** ('Our staff need more training and resources related to activities which they can undertake in the natural environment with autistic children, e.g. how to do creative learning in a natural environment');
- **curriculum links** ('More information for teachers on how to use outdoor visits to the natural environment to support teaching and deliver lessons on science and biology');
- **on-site possibilities** ('Whole-school training experience – perhaps a day workshop at the school to show teachers and teaching assistants how to utilise the nature and the countryside');
- **off-site opportunities** ('Whole-school staff training out in the woods would be great for morale and to give people different ideas and approaches about working in the environment'); and,
- **support staff** ('Empower teaching assistants to take children into the natural environment. Enthuse people about where to go, what activities to do when they are out there').

Coupled with training courses, some interviewees also emphasised the value of gaining **access to resource and guidance materials**. For example:

There is also a need to provide teachers with more resources and guidance to help them use the local environment – perhaps provided to the Enrichment Coordinator, who would disseminate to other teachers in the school.

## Collaboration with external outdoor learning providers

Another key element for any future Demonstration Project with special schools catering for autistic children was the need to involve collaboration with outdoor learning organisations. This idea was put forward by seven of the interviewees in this study. One reason for linking with external organisations was their potential to provide schools with the following much-needed resources:

- **skilled and experienced facilitators** ('Some of our teachers are great in the outdoors, others have no knowledge, so if there wasn't a facilitator on a site, they would not go');
- **information about local opportunities** ('So knowledge to make schools aware of what is available outside on a local level, what services are offered and how these could support the curriculum would be valuable'); and
- **free or affordable visits** ('We would like more [outdoor learning] that we can afford, so that we can go more regularly. We need more organisations/places able to host visits that are free or affordable').

It was clear, though, that developing links with external organisations was not without concerns for several interviewees. The **major question mark in the minds of school staff was the depth of understanding that external outdoor educators have about working with autistic students**. One head teacher of a secondary school for children with moderate learning difficulties, for example, described how: 'One of main issues for us with outside agencies is how information is presented for our students – for example it needs to be pitched at the right level, suitable for secondary level; also we need something which has immediate impact'.

In the light of these sorts of concerns, several interviewees emphasised the need for links between special school and outdoor learning providers to involve:

- **collaborative processes** ('Perhaps we should invite rangers into the school, because this might be the one way to start developing the ability to go out more into the natural environment – it would then be easier to take the students, especially higher ability students, out [to a place] to work with the same rangers. Rangers would need to come in a couple of times over a short timescale, followed up quite closely by a short excursion might have a positive outcome');
- **two-way knowledge exchange** ('We need more information on local areas, local people we can contact who have nice ideas on activities which autistic kids can do in the countryside to maximise the value of visits for example to woodland .... and teachers with our set of skills can come along and support them, with our knowledge of the kids, to guide them on what might work – sharing our skills to make experiences in the natural environment more worthwhile, make sure the kids get the most benefit'); and,

- **communication with parents** (“When I talked to parents about a recent trip to the beach [hosted by an outside organisation] some couldn’t believe what we had achieved with the children, and many were keen to follow up on our trips; quite a few parents find it hard to take out some of the more difficult and challenging children themselves, and they see it as a real benefit that we are prepared to take the children out, to places which they would feel very uncomfortable about going’).

A strong theme underlying all of the above points concerning the need for links between special schools and external organisations is the idea that **even for knowledgeable practitioners the benefits of outdoor learning for autistic children can be surprising**. Even staff who do appreciate the benefits of engaging autistic children with the natural environment can still be ‘surprised’ by the benefits to their students of visiting more distant green space for sessions hosted by outside organizations. As other recent work has demonstrated, school staff can learn new things about their students, even after just one or a few visits (see Blakesley and Payne, 2012; Blakelsey and Blakesley, 2013).

### **Broad focus on the full range of autistic needs and potential benefits**

Interviewees made three further suggestions about the Demonstration Project, all of which were about breadth. These suggestions underlined the need for any future project to encompass:

- **the full range of autistic needs** (‘The range of children with autism is so huge – but for children with severe autism who are non-verbal, it is quite difficult doing things with them outside. A project which developed activities/resources to use with these children would be helpful’);
- **the needs of ‘the whole child’** (‘For many of our children, improving their curriculum knowledge and skills is secondary to the need for us to be able to communicate with them, they need them to gain a sense of where they are in the world – for them to be engaged is absolutely key’), (‘We would have to look at different curriculum areas that a Demonstration Project would support; but wider than this it would have to feed into the ‘Every Child Matters’, and the spiritual, cultural and moral aspects of school life, providing those extra enrichment opportunities – it is about the ‘holistic’ package, not just academic achievement.’); and,
- **evidence of the varied benefits for learners** (‘Should be focused on the benefits for autistic children, in terms of communing/engaging with nature – for a lot of our inner city children experiencing these natural environments first-hand is really powerful. [...] As well as getting the views of teachers, support staff, etc., Student Voice is very important – some of our more able students visiting a farm for example, would give feedback about what they felt about a visit and what value it has for them intrinsically’).

### **3.4 Summary of views on future development of outdoor learning**

- All interviewees expressed an opinion that staff and students in their school would be keen to have more engagement with the natural environment.
- Interviewees highlighted several challenges to developing more outdoor learning, including curriculum and assessment pressure and demands on staff time; concerns over the level of knowledge of some members of staff; and identifying suitable outside facilitators to support engagement programmes with the natural environment.
- On the question of a Demonstration Project for special schools catering for students with autism, most interviewees confirmed that their schools would definitely be interested. The ideas put forward by interviewees can be summarised around three main areas: training and support for special school staff; collaboration with external outdoor learning providers; and a broad focus on the full range of autistic needs and potential benefits.

## 4. Recommendations

This final section draws together the key findings from the insight research into a series of recommendations for a possible Demonstration Project focused on the engagement of autistic students with the natural environment.

Those involved in making plans for the development of a Demonstration Project with special schools for autistic children should:

- **recognise the potential benefits for children on the autistic spectrum of engaging with the natural environment.** Special school staff interviewees were keen to highlight benefits for social skills and well-being; personal, social and health education; and enhanced curriculum learning.
- **take note of the fact that there are clear differences between schools in terms of the degree of engagement with the natural environment.** While some schools have well-developed provision in certain contexts, others have only moderate or developing outdoor learning programmes, and, in one case, use of the outdoors was very limited.
- **be encouraged by the enthusiasm expressed by all of the interviewees for expanding their current programmes of engagement with the natural environment, and for the idea of developing a Demonstration Project.** Despite the differences in current provision, all schools, including those which were considered to be ‘well developed’, were extremely keen to do much more.
- **recognise that a Demonstration Project needs to develop a sustainable, evidence-informed model to help schools develop their own engagement programmes in the future.** There has been very little research or development into how to effectively engage autistic children with the natural environment. Consequently, little is known about the activities and circumstances that are most appropriate for these kinds of learners, and systematic evidence on the benefits in terms of learning, social skills and well-being is rare. It is important for a Demonstration Project to address such gaps.
- **ensure that any Demonstration Project considers the requests by teachers for: more training and support for school staff, collaboration with external outdoor learning providers, and a broad focus on the full range of autistic needs and potential benefits.** It is particularly important that any future Demonstration Project seeks creative combinations between the expertise of special school staff (how to work with autistic learners) and the expertise of outdoor educators (how to facilitate learning in natural environments).
- **pay careful attention to the mix of challenges and opportunities facing staff in special schools catering for autism.** Significant challenges arise from the fact that there are real

differences between schools (and between classes within schools) in terms of the severity of autism exhibited by students, and hence their special needs and their ability to learn. There are also important opportunities in working with special schools for autistic children, such as strong recognition of the importance of varied learning environments and the need for more creativity in the curriculum.

## References

Blakesley, D. & Payne, S. (2012) *Visiting the Kent countryside: a guide for parents of children with autism*. Autism and Nature: Maidstone.

Blakesley, D. & Blakesley, T. (2013) *Visiting the East Sussex countryside: a guide for families, children and young people with autism*. Autism and Nature: Maidstone.

DEFRA (2011) *The Natural Choice: Securing the Value of Nature*. London: HMSO.

Dillon, J. & Dickie, I. (2012) *Learning in the Natural Environment: Review of social and economic benefits and barriers*. Natural England: London.

Natural England (2012) *EU Tender for Natural Connections – Demonstration Project*. Natural England: London.

Rickinson, M., Hunt, A., Rogers, J. & Dillon, J. (2012) *School Leader and Teacher Insights into Learning Outside the Classroom in Natural Environments*. Natural England: London.

## Part 2

### Benefits of Engagement with the Natural Environment for Children with Autism - Review of the Evidence

This document reviews recent evidence on the benefits of engaging children on the autistic spectrum with the natural environment. The specific aims of the review were to:

- Identify what research studies have been undertaken on topics relating to autistic children and the natural environment;
- Review and synthesise the findings emerging from these studies in terms of what they indicate about autistic children and the natural environment; and
- Draw out the implications for policy, practice and future research in the area of autistic children and the natural environment.

### Main Findings

**1. The current evidence on the benefits of engaging children on the autistic spectrum with the natural environment is very limited.** While there are many peer reviewed studies to demonstrate the benefits of engaging people in general with the natural environment, the same cannot be said for children on the autistic spectrum.

**2. Some, typically small-scale, studies have been undertaken on outdoor activities with autistic children (e.g. animal therapy, gardening projects, summer camps, field visits).** Useful insights can also be drawn from wider but related literatures (e.g. studies of outdoor learning with children in general, and work with children with SEN, disabilities and ADHD).

**3. It seems reasonable to conclude on the basis of the current evidence that engagement with the natural environment can be beneficial for children on the autistic spectrum.** This reflects the fact that: (i) there is strong evidence that outdoor activities can benefit children in general; (ii) there is considerable evidence that outdoor learning is particularly helpful for children with SEN who often face more difficulties with classroom learning and greater barriers to accessing the outdoors; and (iii) there is some evidence showing autistic children benefiting from initiatives such as gardening projects, summer camps, field visits and animal therapy.

**4. Research-based understandings of many aspects of autistic children's engagement with the natural environment are yet to develop.** While some information is available about how certain aspects of outdoor settings might help autistic learners, there is generally very little known about how different kinds of experiences in the natural environment can be more or less beneficial for different children across the autistic spectrum.

## Recommendations

This evidence review suggests that:

**1. Outdoor learning in the natural environment for children with autism deserves further consideration and investigation by practitioners, policy makers and researchers.** It is important that any future developments embrace the full range of autistic learners, and encompass outdoor activities connected with schools, families and communities. It is also crucial that practical initiatives are as much about using and generating evidence as developing practice. In other words, research-informed approaches and evaluation need to be at the heart of future outdoor learning projects with autistic children.

**2. The evidence base on autistic children and the natural environment needs strengthening.** This has implications for educational researchers working on outdoor learning, disability researchers exploring therapeutic approaches and natural environment researchers studying use of the outdoors. Autistic children and young people have been notable by their absence in much of the discussion within these different research fields. There is a clear need for more and better research into autistic children and their outdoor learning in the natural environment.

**3. Future research needs to address the fact that little is known about the outdoor activities and circumstances that are most appropriate for different kinds of autistic learners.** Researchers need to be mindful of the fact that autism is a complex condition, and whilst most people with autism share what are often referred to as the 'triad of impairments', individuals have very different combinations of symptoms and vary widely in ability and personality. Any research programme therefore needs to investigate how to effectively engage autistic children with the natural environment, right across the autistic spectrum. Such a programme may be undertaken in the context of school learning, to develop sustainable, evidence-informed models to help schools develop their own engagement programmes in the future.

## 5. Introduction

### 5.1 Background

This report reviews the evidence for the benefits of engaging children on the autistic spectrum with the natural environment. It comes against the backdrop of increasingly robust evidence indicating that contact with the natural environment has considerable benefits for a child's health and well-being (e.g. Rickinson *et al.*, 2004; Pretty *et al.*, 2007; Moss, 2012). It builds on earlier Natural England research into 'learning outside the classroom in natural environments', including: a synthesis of the evidence on the benefits and barriers to such learning (Dillon and Dickie, 2012); and an investigation into school leaders' and teachers' views of current provision and possible future development of outdoor learning in different types of schools nationally (Rickinson *et al.*, 2012). Furthermore, this evidence review (and its accompanying Insight Report) can be seen as a response to a number of wider concerns, including:

- the urgent need, as set out in the 2011 Environment White Paper, to address the growing disconnection of children from the natural environment (Defra, 2011);
- the beneficial role that learning activities in natural environments can play, but the barriers and local challenges that can limit outdoor learning in some schools (Dillon and Dickie, 2012);
- the particular relevance of outdoor learning for children with special educational needs (SEN) who, along with other groups, can struggle with classroom-based learning (Rickinson *et al.*, 2012); and
- the need for improved understandings of the current evidence base relating to autistic children and outdoor learning in the natural environment (Blakesley and Payne, 2012).

It would appear that, whilst there has been some outdoor learning research with children who have mental health problems, Attention Deficit Hyperactivity Disorder (ADHD) and/or are socially disadvantaged, there would appear to have been very few studies with children on the autistic spectrum. This project therefore sought to clarify what (if any) research studies have been undertaken on the topic of autistic children's engagement with the natural environment.

### 5.2 Aims

The aim of this study was to review and synthesise recent research evidence on engaging children with a diagnosis of autism with the natural environment and nature.

More specifically, this evidence review sought:

- to identify what research studies have been undertaken on topics relating to autistic children and the natural environment;

- to review and synthesise the findings emerging from these studies in terms of what they indicate about autistic children and the natural environment; and
- to draw out the implications for policy, practice and future research in the area of autistic children and the natural environment.

### 5.3 Methods

Search parameters were established to strike a balance between, on the one hand, the desire to be comprehensive in what was included and, on the other hand, the need to be realistic as to what could be achieved within the short time-scale of the project. The inclusion of work published not only in the United Kingdom (UK) but also internationally reflected a desire for evidence that was UK-specific, as well as an interest in any relevant international evidence. With regard to the type of literature included, while the main focus was on published journal articles, books and research reports, unpublished conference papers and anecdotal evidence from websites were also included in order to identify as much evidence as possible.

Relevant research literature was identified by undertaking bibliographic database searches, including: *Google scholar*, *PsycINFO*, *Science Direct*, *BioMedCentral*, *ERIC (Education Resources Information Centre)*, the National Autistic Society library database and general internet search engines. As relatively few citations were identified which described studies with children who had a specific diagnosis of autism, the literature searches were broadened to include studies of children with more general Special Educational Needs (SEN), and related studies which might inform the discussion of engaging autistic children with the natural environment.

### 5.4 Overview of the evidence

It is important to state right at the outset that the evidence base on autistic children and the natural environment is not well developed. While there are many peer reviewed studies to demonstrate the benefits of engaging people in general with the natural environment, the same cannot be said for children on the autistic spectrum. This situation can be seen to reflect a number of factors:

- the literature on outdoor learning has tended to concern children in general as opposed to specific groups of learners such as autistic children (e.g. Rickinson *et al.*, 2004);
- studies of pupils with special educational needs (SEN) have typically reported their findings as general trends rather than by individual impairments (e.g. RHS, 2010);
- studies that have focused on autistic young people and physical exercise have tended to overlook 'green exercise' or activities in the natural environment (e.g. Lang *et al.*, 2010);
- research on nature-based therapy or 'green care' has mainly focused on people with mental health problems, but not those on the autistic spectrum (e.g. Sempik *et al.*, 2010)
- research-based understandings about autism and possible therapeutic approaches are themselves still developing (e.g. O'Haire, 2012).

So, while the prevalence of autism is increasing amongst children in the UK and internationally, the number and quality of research studies on autistic children and the natural environment is lagging far behind. This review has found very few reports in the peer reviewed literature, where the benefits of engaging children on the autistic spectrum with the natural environment have been quantified and systematically examined.

Having said that, this does not mean that there is a complete absence of any research-based evidence at present. This report also makes clear that some useful insights can be drawn from the following sources of evidence:

- individual studies and reviews on the impact of various outdoor learning activities on children in general (e.g., Peacock *et al.*, 2007; Dillon and Dickie, 2012);
- investigations into how pupils with SEN have responded to, and benefited from, learning experiences in natural environments (e.g. Fox and Avramidis, 2003);
- research on the barriers that disabled and other disadvantaged children can face in accessing the outdoors (e.g. Shelley, 2002);
- non-peer reviewed studies that have focused on autistic children and various outdoor activities, such as field visits, gardening projects, summer camps, physical exercise, farm visits and animal therapy (e.g., Schreiber, 2009; Blakesley and Payne, 2012; Coughlan and Blakey, 2012);
- conceptual studies that have drawn lessons from the needs of autistic learners for the design and use of outdoor learning spaces (e.g. Sachs and Vincenta, 2011)
- peer-reviewed literature that have described studies of children with related conditions such as ADHD (e.g., Faber Taylor and Kuo, 2009); and
- anecdotal evidence from organisational websites, videos<sup>3</sup> (e.g. [www.dragonflyforest.org/about-us/results](http://www.dragonflyforest.org/about-us/results)), and correspondence with practitioners.

## 5.5 Structure of the report

Drawing on the above evidence, the findings of this review are presented in three sections. Section 6 looks at research that has been undertaken on engagement with the natural environment for children in general. In Section 7, the focus shifts to children with autism, clarifying the nature of autism and exploring the evidence for benefits of engaging with the natural environment. The report ends with a series of key findings and implications for practice/policy development and future research.

## 6. Studies of Children in General

This section looks at research that has been undertaken on engagement with the natural environment for children in general. The underlying concern is to identify any issues emerging from this more general literature that have pertinence to the question of benefits for children with autism. The discussion covers:

- therapeutic nature experiences;
- outdoor learning activities; and
- disconnection from nature.

### 6.1 Therapeutic nature experiences

Experiences of the natural environment, i.e. visits to the green spaces and contact with nature, have been shown to bring about considerable benefits for physical health and psychological well-being of people in general (e.g. Kaplan, 1995; Tabbush and O'Brien, 2003; Rickinson *et al.*, 2004; Bingley and Milligan, 2004; Pretty *et al.*, 2005; Peacock *et al.*, 2007; Pretty *et al.*, 2007; Bird, 2007; Woolley *et al.*, 2009; Moss, 2012; Logan and Selhub, 2012; Passy, 2012). The same is true for people with disabilities and Special Educational Needs (SEN), especially children and young people (e.g. Faber Taylor *et al.*, 2001; Sanders *et al.*, 2009). Indeed, the Council for Learning Outside the Classroom (LOtC), along with many other organisations, recognises that children with SEN have much to gain from “frequent opportunities to get out into the school grounds or local community” (LOtC<sup>1</sup>).

Research on the ‘therapeutic’ value of nature has tended to focus on people in general, but studies have also been undertaken on the effects of green exercise on other groups, such as people with mental health problems (e.g. Peacock *et al.*, 2007) and Alzheimer’s sufferers (e.g. De Bruin *et al.*, 2009). Beneficial effects of ecotherapy (working with landscapes) for people with mental health problems have also been reported (Burls, 2008). Several projects have demonstrated benefits to children with SEN of experiencing the natural world through horticulture and gardening (Sanders *et al.*, 2009; Botanic Gardens Conservation International, 2010, 2011; Royal Horticultural Society, 2010, 2012). Indeed, the Royal Botanic Gardens Kew and the Eden Project have education programmes which are accessed by special schools. There are also several NGOs dedicated to this area, such as Thrive (a UK charity providing support for research and practice into ‘social’ and ‘therapeutic’ horticulture) and Gardening for the Disabled. However, none specialises in working with people on the autistic spectrum.

### 6.2 Outdoor learning activities

A seminal review of the benefits of learning outside the classroom (Rickinson *et al.*, 2004; Dillon *et al.*, 2006) concluded that “substantial evidence exists to indicate that fieldwork, properly conceived, adequately planned, well taught and effectively followed up, offers learners

opportunities to develop their knowledge and skills in ways that add value to their everyday experiences in the classroom”. Four key areas of impact on children were identified: cognitive; affective; social/interpersonal; and physical behavioural. Substantial research evidence was found to suggest that outdoor adventure programmes can positively impact on young people’s attitudes, beliefs and self-perceptions (such as confidence and coping strategies); and interpersonal and social skills. However, the review concluded that the evidence base for benefits of outdoor learning for cognitive and physical/behavioural benefits was less strong, although evidence of benefits to the development of academic skills; improved engagement and achievement was found. Despite critically examining 150 pieces of research on outdoor learning published between 1993 and 2003, no evidence was reported of benefits for children or young people with autism, indicating the paucity of information available at that time.

The review highlights ‘physical disabilities and special educational needs’ as one of the factors affecting outdoor learning, citing Healey *et al.* (2001) who discussed a range of attitudinal, institutional and physical barriers experienced by university students with visible and less apparent disabilities, and the way in which these students can be helped. Reference was also made to the benefits of outdoor adventure activities for children with special educational needs and emotional/behavioural difficulties; and the review cited the work of Farnham and Mutrie (1997), who studied a four day residential outdoor education programme for a class of 19 teenagers with special educational needs (average age of 14, range 13-17 years). These authors found evidence of several interpersonal benefits, including: decrease in tension and anxiety; decrease in loud and aggressive behaviour; and an improvement in overall group cohesion. Benefits to group cohesion remained after six weeks, but there was no lasting impact on tension and anxiety.

More recently, a review by eftec (eftec, 2011) for King’s College London on the economic benefits of learning outside the classroom in natural environments reported a range benefit categories, including: educational attainment; attitudes to other children; awareness of environment and natural science skills; behavioural outcomes and social cohesion; health benefits; and attitudes to other children. The study noted that there are extensive overlaps between the different benefit types and beneficiaries identified, indicating that their value to society is probably greater than each individual part viewed separately. In a commentary, Dillon (2011) pointed out that whilst qualitative evidence for these benefits is compelling, quantitative evidence is lacking. Furthermore, specific benefits from engaging children on the autistic spectrum, or children with SEN were not specified.

The overall King’s/Natural England report (Dillon and Dickie, 2012) goes on to identify various outcomes to participants: increasing knowledge and understanding, developing skills, changing attitudes and behaviours, health and well-being benefits, self-efficacy and self-worth; benefits to schools, teachers and the wider community; and benefits to natural environment community. It rightly highlights the fact that many benefits do not occur in isolation, and that in any group of students, the personal outcomes for each individual could be different. The report looks at each of these areas in more detail, citing some of the key published research studies

which support each. Some 41 research papers and reports are cited, only two of which focus specifically on children with SEN: the work of Andrea Faber Taylor and her colleagues in the States on children with Attention Deficit/Hyperactivity Disorder (ADHD) and benefits to their health and well-being (see Section 3.9).

### **6.3 Disconnection from nature**

Based on a series of interviews with children aged ten to eleven around the UK, Thomas and Thompson (2004) came to the conclusion that most children are losing connection with the natural environment, particularly those from urban environments. They recommended that new ways are found to facilitate environmental education through out-of-school learning and green school design, and that national policy should recognise the link between children's well-being and the environment.

The likelihood of children visiting local green space has fallen – now less than 10% of children play outdoors, compared to 40% of adults when they were young (England Marketing, 2009). Parental fears of strangers and road safety prevent them from giving much freedom to their children. And in a pilot project undertaken in several cities in southern England (England Marketing, 2009), the vast majority (>90%) of adults and children questioned during a baseline survey felt that children should visit natural places more frequently, but a significant proportion of children had not participated in a range of outdoor activities. Following a series of pilot projects engaging children with the natural environment, many benefits were reported such as higher levels of concentration when the children were outside, and a number of recommendations were made, such as the types of project which are most beneficial and the period of time over which projects are sustained.

While special schools and schools for children with autism were not included in the above study, there is a growing body of evidence which suggests that disconnection from nature can be even greater for children with SEN. Woolley (2012) makes clear that children with disabilities may be under-represented among those children who do use green space and outdoor play spaces. The reasons for this trend are reported to include: physical barriers; lack of information; inadequate facilities; people not wishing to access these place on their own; and difficulty with transport (after Price and Stoneham, 2001). Similarly, according to Shelley (2002), barriers to undertaking leisure activities identified by parents of disabled children include:

- being made to feel uncomfortable due to long queues and/or crowds (which can be particularly challenging for children with autism and learning difficulties);
- lack of suitable facilities; and
- cost and transport restrictions.

Others have reported social, physical and institutional barriers to outdoor play for disabled children (e.g. John and Wheway, 2004; Dunn and Moore, 2005). Pressures on time may also be a barrier for some families with disabled children (von Benzon, 2010). An interview survey of

SEN schools and environmental centres, von Benzon found a wide variety of opportunities to access nature, both within school grounds and through regular offsite trips. Teachers also recognised benefits for children with SEN, including learning, caring for the environment through greater awareness and play. The study also identified significant differences between the schools and environmental centres concerning barriers and opportunities. Schools emphasised educational and development benefits and resource constraints; whereas environmental centres emphasised recreation and play (thus denying opportunities for learning) as the major opportunity and mobility issues as the principle barrier. In contrast, in a series of case stories describing visits to the countryside by children with a wide range of conditions on the autistic spectrum, staff from Natural England, Woodland Trust, BTCV and Sussex Wildlife Trust all included educational opportunities in their approach (Blakesley and Payne, 2012; Blakesley and Blakesley, 2013).

#### **6.4 Summary of studies of children in general**

Experiences of the natural environment and contact with nature are well known to have considerable benefits for physical health and psychological well-being of people in general and for people with disabilities and SEN, especially children and young people. Substantial evidence also exists for the benefits of outdoor education for children, both in the short and long term. Despite strong evidence for the benefits, it is clear that most children are losing connection with the natural environment. And children with disabilities, including those on the autistic spectrum, may face additional barriers to accessing the outdoors.

## 7. Studies of Children with Autism

Having looked at studies of children in general, the focus in this section narrows to research undertaken specifically with autistic children. After an opening clarification of autism as a condition, this section then explores evidence from studies of:

- outdoor learning activities
- gardening and horticulture
- landscape design
- summer camps
- physical exercise
- farm experiences
- animal therapy
- nature experiences for children with ADHD.

### 7.1 What is autism?

Autism is a complex, lifelong condition, sometimes referred to as autism spectrum disorder (ASD). The word 'spectrum' is used, because while all people with autism share three main areas of difficulty, their condition may affect them in very different ways. Autism has also been referred to as Pervasive Development Disorders (PDD) and in the *Diagnostic and Statistical Manual of Mental Disorder (DSM-IV)*, 'autistic disorders' includes criteria for diagnosing classic autism, Asperger's Syndrome, Rett's Disorder, Childhood Disintegrative Disorder and Pervasive Developmental Disorder – Not Otherwise Specified (PDD-NOS). However, the concept of autism may be modified in the fifth edition of the manual, DSM-5, to be published in 2013 (Singer, 2012).

Some people with autism will be able to live relatively 'everyday' lives whilst others require a lifetime of specialist support. The three main areas of difficulty which people with autism share are sometimes referred to as the 'triad of impairments'. They are:

- *Difficulty with social communication:* people with autism have difficulties with both verbal and non-verbal language. Many have a very literal understanding of language, and think people always mean exactly what they say.
- *Difficulty with social skills (interaction):* people with autism often have difficulty recognising or understanding other people's emotions and feelings, and expressing their own, which can make it more difficult for them to fit in socially.
- *Difficulty with social imagination:* people with autism have difficulty understanding and predicting other people's behaviour, making sense of abstract ideas, and imagining situations outside of their immediate daily routine.

In addition to the three main areas of difficulty, people on the autistic spectrum may also have other characteristics such as narrow and intense interests, sensory sensitivity, learning disabilities and repetitive behaviour (including a love of routines). Individuals have different combinations of symptoms and these may change over a person's lifetime. Whilst it is widely believed that autism is the result of a disruption to brain development, caused by a combination of genes and the environment (Nature Editorial, 2011), relatively little is known about the mechanics of the condition, and hence many aspects of autism remain poorly understood. The outlook for people with autism varies with the individual; some people can look forward to independent, fulfilling lives; others may develop complex medical, educational and social difficulties, leading to very different outcomes (Farley *et al.*, 2009).

Unlike many other disabilities, it can often be difficult to create an awareness of autism, as people with autism do not appear to others to be 'disabled'. People with autism have said that the world, to them, is a mass of people, places and events, which they struggle to make sense of, and which can cause them considerable anxiety. In particular, understanding and relating to other people, and taking part in everyday family and social life may be particularly difficult for them.

The National Autistic Society has commented that autism is more common than people imagine, with over half a million people on the autistic spectrum in the UK, equivalent to about 1 in every 100 people. Similar figures have been published for the prevalence of the condition amongst children in the USA (quoted in Weintraub, 2011). Cases of autism have been rising steadily since the 1970s, with a significant rise during the first decade of the 21<sup>st</sup> century, which can be only partly explained by factors such as increased awareness and increasing parental age. Clearly, major scientific challenges to understanding the condition still remain, with much research now focussed on the genetics of autism (State and Levitt, 2011).

## **7.2 Outdoor learning activities**

A small number of studies have been undertaken into the impact of outdoor learning activities involving autistic school pupils. In 2001, for example, Dominguez and Schilling carried out a pilot project with 10 children with SEN, including autism, to enable them to form connections with the natural environment. The learning activities included classroom- and field-based work. A post-course test for the children was inconclusive, but in the longer term, it was suggested that the children had retained some knowledge of the environment. No assessment was made of the children's mental health or well-being. However, the authors made a very important recommendation; that partnerships be established between 'conservation' professionals and educators to facilitate the provision of environmental education, a theme which is explored in the accompanying Insight Review.

A later Taiwanese study, based on semi-structured interviews with 15 teachers, volunteers and parents of children with autism, showed that when children with autism were regularly engaged in outdoor activities, they experienced improvements in seven key areas (Chang and

Chang, 2010). These areas were: social interaction; communication; behaviour; emotion; cognition; sensory issues; and physical activity. The benefits most frequently encountered were improvements to a child's emotional state, and increases in their cognitive ability.

In recent pilot studies in Southeast England, twelve visits were made to natural places in Kent and East Sussex, by seven classes from participating schools for autistic children (Blakesley and Payne 2012; Blakesley and Blakesley, 2013). Visits were hosted by education facilitators from Natural England, Woodland Trust, Sussex Wildlife Trust and BTCV, and lasted between one and four hours. Venues included National Nature Reserves, woodland and country parks. Both primary and secondary children took part, some with severe autism, while others were high functioning, with a range of conditions in between. Although this study was not designed to be large-scale or quantitative, the teachers were asked to complete a questionnaire after each visit about the behavior of their pupils, and benefits which they had observed. Positive outcomes were reported for many of the children at both ends of the autistic spectrum, even after just one or two visits. For example, teachers of secondary school pupils with severe autism witnessed examples of: increased levels of calm; increased levels of patience; careful listening; allowing hand over hand guidance; increased levels of independence; remaining on task and sharing space and the task; sitting still and concentrating; willingness to join the group; initiating play and interaction which was two way and meaningful.

On another visit, teachers of Year 7 pupils with more severe autism remarked that the children were more relaxed away from school, and clearly enjoyed the practical activities. They were pleased and genuinely surprised at the children's teamwork, perseverance and in some cases, improvements in behaviour. The session reinforced teacher's views that children with autism learn better by experience and that 'outdoor classroom' environments such as woodland are very important to learning. On a subsequent visit to a rocky shore, the teachers commented that most of the pupils showed a different side to their social skills, getting on well together and responding well to the staff and unfamiliar adults. One pupil with very poor fine and gross motor skills showed a level of determination which amazed the teachers (Blakesley and Blakesley, 2013).

It is clear from these limited studies, that more detailed research projects are necessary to thoroughly evaluate the potential benefits of countryside experiences for children with autism, and to develop a clearer understanding of how such visits should be managed for children with differing levels of autism.

### **7.3 Gardening and horticulture**

The therapeutic value of gardens and horticultural activities is known to have significant benefits for the health and well-being of people in general (e.g. Herbert, 2003) and for people with disabilities and SEN, especially children and young people (Sanders *et al.*, 2009; Rickinson, 2010; BGCI, 2010, 2011; RHS, 2010, 2012; Hussein, 2010). But what evidence is there of benefits for groups of autistic children?

Some relevant insights have been generated by studies of RHS schools gardening projects, which included children with autism amongst classes with a range of special educational needs (RHS, 2010; 2012). Children taking part in the first RHS schools gardening project (RHS, 2010) ranged in age from four to 16 years, with a diverse range of conditions, including autism and Asperger's Syndrome; Behavioural, Emotional and Social Difficulties (BESD); Cystic Fibrosis; Downs Syndrome; Dyslexia, Dyspraxia; Elective Mutism; Gross Development Delay; Hearing Impairment; Profound Multiple Learning Difficulties (PMLD) and Speech and Language Development Difficulties. While the findings were not presented in terms of children's individual disorders, across all of the participants benefits were identified in two key areas:

- Skills development – including improvements in cognitive skills, physical skills, patience and concentration; and
- Personal progress – reflected in being better able to reach targets and work in teams, being more confident and improving in the Social and Emotional Aspects of Learning (SEAL).

Furthermore, some children who did not communicate before, formed new friendships during outdoor gardening sessions. The RHS project demonstrated that gardening can be 'life changing' for many children with SEN (including autism), and there is no reason to suppose that this would not also be the case for children participating in other outdoor activities, such as engaging with the nature in the natural environment.

In a DCSF/Growing Schools Case Study Report, Rickinson (2010) considers the many benefits for children with SEN involved with growing plants and caring for animals. Based on practitioner testimony from a range of school and beyond school settings, the report illustrates how outdoor growing can help children with SEN:

- to enjoy new experiences and relationships (e.g. sensory experiences, informal relationships and experiences of freedom and open spaces);
- to develop a sense of responsibility and pride (e.g. taking responsibility, sense of purposes and self-confidence and pride); and
- to enhance their learning and achievement (e.g. curriculum learning, vocational skills, and life skills).

This publication also highlights, however, the complexity and sophistication of facilitating productive learning with children with SEN in outdoor settings. It encourages practitioners to seriously consider a range of factors, such as: adapting activities and facilities for children with SEN; having the flexibility to change situations for SEN children, all of whom will be unique; making outdoor tasks sufficiently different from indoor class activities to stimulate children with SEN; being prepared to continually praise children, and set up activities with a good chance of success; using outdoor sessions to advance the school curriculum for SEN children; and remembering the importance of celebrating success.

In a more accessible publication for parents, *'Gardening for children with autism spectrum disorders and special educational needs'*, Etherington (2012) discusses the benefits of horticultural therapy, which include cognitive development, reduction in anxiety and depression from being outside, and sensory stimulation.

## **7.4 Landscape design**

While not focused specifically on the benefits of outdoor experiences for autistic children, a number of studies that have looked into the *design* of outdoor learning spaces for autistic learners may well provide some useful pointers for future research and practice.

Based on the advice of professional therapists, Herbert (2003) discussed the incorporation of indoor therapeutic strategies into the design of therapeutic gardens, most of which could equally apply to the natural environment more generally. Her thesis is based on discussions with healthcare professionals, not on the results of actual programmes with autistic children. Natural places in Britain often have many of the Sensory Integration activities employed by therapists to maintain arousal and attention. Herbert mentions the value of swings and rope chairs for enhancing motor development – such equipment is often found in adventure play areas situated in natural places, such as Forestry Commission public forests. And of course, tree stumps, logs, fallen trees and stepping stones are just a few examples of 'natural' play equipment that children with autism might enjoy in the natural environment. For garden design, cave-like structures are suggested for 'quiet regrouping' – seats under trees and dens are often found in natural places. Avoidance of harsh lighting, particularly on summer's days can be achieved through entering the dappled woodland shade. Herbert suggests that soft colours of blues and greens enhance classroom learning – the value of the countryside is obvious here, indeed Blakesley and Payne (2012) highlight walks in bluebell woods in spring, for children with autism who find the colour blue soothing.

Sensory integration also involves smell, touch, sound and in some cases, taste. Herbert (2003) discusses the value of essential oils in the classroom for stimulating the senses of a child with autism; these could be substituted in therapeutic gardens by planting beds of fragrant flowers. Some public gardens, nature reserves and country parks already have beds of fragrant plants, which are particularly suited for children with autism (Blakesley and Payne, 2012; Blakesley and Blakesley, 2013). Many wild plants are also naturally fragrant, such as Gorse, Meadowsweet and Water Mint, but leaves and flowers can also be picked in the garden, and taken into the countryside to stimulate children with autism (Blakesley and Blakesley, 2013). Different textures can also be incorporated into therapeutic gardens, and are readily available in natural places. Leaves come in a variety of textures, shapes, colours and sizes. Bark, wool, grass, walls, lichens, pebbles and water are just a few of the different textures which children with autism might find stimulating in the countryside. Sound is also easily explored in the countryside; for example, children with autism can use sound boards when listening for the wind, birdsong, running water, tractors etc. As Herbert points out, therapists use "a beanbag chair, soft music, and an indoor water feature to create the atmosphere for a quiet 'Corner of the World'... the

landscape architect uses vegetation, the gurgling of an outdoor water feature, and bird song to create an escape outdoors”. Many natural places have such places in abundance. Herbert also highlights the role of the outdoors in general for play therapy: “when or if a child reaches sensory overload, the child could release his/her pent-up frustration in an acceptable way by, for example, twisting himself on a swing and then spinning and spinning to his/her heart’s content, whereas spinning in the classroom would be considered an unacceptable behaviour”.

Based on published reports of the therapeutic value of nature generally; garden design principles for healthcare settings; the nature of autism; and informal interviews with autism; and personal experience, Herbert proposes a series of guidelines for landscape designers. Although these are essentially untested, it is interesting to note that many of her design features can be found in the natural environment. The critical difference though between a designed therapeutic garden and a natural place, is that a garden offers the possibility of providing a wide variety of features in a relatively small, secure space. Most natural places will provide some, but not all of the features, and therefore will always suit some children with autism more than others. Similar guidelines have been developed for the design of outdoor therapy gardens within the context of diagnostic and treatment facilities for children on the autistic spectrum (Wilson and Johnson, 2007). Two zones were included in the design; one to provide a calming effect for hypersensitive reactions; and a second designed to use multiple sensory stimulation to invigorate and heighten the senses for hypersensitive reactions.

In 2010, Sachs and Vincenta presented a webinar called ‘Prescription for play: nature-based learning and play for children with autism and other special needs’, which was later published (Sachs and Vincenta, 2011). The premise for their study was that outdoor play and learning environments *should* connect children with autism to the restorative benefits of nature, while building on skills learned in the classroom. Based on this assumption, they considered the characteristics of children with autism, and explored design considerations for outdoor, nature-based spaces which should benefit them. They noted that children with autism are often in “highly structured indoor learning environments”. Accessibility is the primary issue in designing outdoor spaces for SEN children, but for children with autism, other issues need to be addressed, such as sensory, cognitive, visual and auditory impairment, limited fine and gross motor skills. They comment that the design of outdoor environments should be based on evidence and research, but acknowledge that for autism, the evidence is minimal. Consequently, they base their design concept on general knowledge of the autism condition; firsthand accounts from people with autism and their carers; information on nature-based play for all children; and standard playground guidelines. The concept includes a set of guidelines for designing outdoor environments for children with autism, mindful of the heightened sensory issues of these children, and difficulties they might have in processing too much information in the outdoors. Although the design principals concern the design of outdoor environments, they may be helpful when considering how engaging with the natural environment more generally might benefit children with autism. The guidelines are presented in Table 7.1, with a commentary on how these relate to engaging children on the autistic spectrum with the natural environment more generally. The ideas which Sachs and Vincenta advocate for designing

outdoor spaces clearly have some relevance to informing the selection of natural places, and the design of activities during visits, although these are not based on peer-reviewed research studies.

**Table 7.1: Design guidelines for outdoor play spaces for children with autism (after Sachs and Vincenta, 2011) and how they can be related to visits to natural places**

Guidelines (Sachs and Vincenta)	Issues to consider when visiting natural places with autistic children
Tranquil and quiet location	Many natural places avoid distractions and noises which can be overwhelming for some children
Fencing to ensure safety and security	Most natural places do not have this level of security, which is problematic for some children
Wide paths to eliminate feeling of crowding	Many natural places have wide paths, suitable for children who fear crowding
Avoid toxic plants	Some children explore the world through taste, so supervision is important in natural places, where some plants are poisonous
Orientation maps to illustrate place, and what happens next	Charts may be used to show daily schedule, and what happens next
Provide shade for children with photosensitivity	Many natural places, such as woodland provide shade
Provide transitions between spaces/activities for children uncomfortable with change	More challenging when travel is required to more distant natural places; time taken to get children ready for a bus journey, and getting them into, and then out of transport can be significant
Elements of consistency in design	-
Opportunities for increased socialisation	Visits to natural places should also achieve this goal
Provide visual aids and signage	Picture exchange system may be used for visits to natural places
Provide opportunities to overcome sensory issues	Children may have hyper- and hypo-sensory systems: natural places offer a good way to get some children familiar with different textures, sounds, fragrances etc
Provide exercise for increasing motor skills and balance	Walks and activities in natural places help with fine and gross motor skills, whilst allowing time also to engage with nature
Provide soothing areas	In natural places, children can be taken aside until comfortable; choice of destination is important for some children
Build in challenges	Many activities can be used in natural places to challenge children with autism

## 7.5 Summer camps

In thinking about autistic children and the natural environment, it is crucial to take into account activities beyond school and the family. One good example of such activities, particularly in a North American context, is summer camps. As far back as 1977, Kobayashi and Murata reported that therapeutic camping for children with autism (4-12 years old) resulted in improvements in behaviour. The authors attributed this to group activities undertaken away from the site of everyday life (Japanese paper with English summary). Since that time, a number of studies have investigated various aspects of social development at summer camps in

the USA, for example investigating the interactions between campers with and without disabilities (Boyd *et al.*, 2008).

Many families in the USA face particular difficulties with children on the autistic spectrum during the summer months (Brookman *et al.*, 2003). At this time, schools are in recess, and activities for children with autism are limited, causing significant stress for many parents. Based on studies with eight autistic children (4-10 years old), Brookman *et al.* demonstrated that with the support of properly trained aides, able to facilitate social interactions between autistic children and their neurotypical peers, children across the autistic spectrum were able to participate in a range of camp activities. Most of these studies rarely consider the engagement of children with disabilities with the natural environment, and often focus on activities such as sport, art and crafts.

The Dragonfly Forest summer camp ([www.dragonflyforest.org/about-us/results](http://www.dragonflyforest.org/about-us/results)), has a programme which includes many activities to engage children on the autistic spectrum with the natural environment, such as canoeing and a ropes course. The aim is to build confidence and provide opportunities for social development, and increase independence for children with autism and other medical conditions. The outcomes for children who attend the six day residential camps are followed up through interviews with parents nine months after the camp. Outcomes are measured against friendship skills; independence; teamwork; perceived competence (personal belief); interest in exploration; and responsibility. For children with autism and chromosome 22Q deletion, progress was made in each of these categories. In a recently-launched after-school programme for children with autism (7-14 years old), promising results have also been achieved with friendship skills, independence and teamwork, although the activities undertaken in this programme are unclear.

In Ontario, Canada, Coughlan and Blakey (2012) used phenomenological analysis of interviews with camp staff and carers to assess the benefits of contact with nature and physical activity in a summer camp for children diagnosed with autism, ADHD and learning disabilities. Camp sessions last for 10-14 days, with approximately 35 campers supported by 30 members of staff. Four meta-themes emerged from the analysis of interviews:

- *Encouraging mental and physical benefits and fostering a connection to the environment for youth from the city through outdoor activity* – participants described natural settings as being more calming and stimulating than the city (which some described as over stimulating and overwhelming for their children). Most children enjoyed their experience and found an interest in the natural environment, developing a greater awareness for nature. Several carers commented that their children had early childhood contact with nature, coupled with an interest and enjoyment of the environment.
- *Promoting greater levels of physical activity at camp in order to encourage a healthy lifestyle, reduce frustrations and control behaviour* – with one exception, children engaged in higher levels of physical activity at camp, compared to their home environment. Some

interviewees suggested a link between increased physical activity and better sleep patterns amongst the children.

- *Promoting social skills development for youth with social deficits through a supportive environment and group experiences* – many interviewees described strong changes in children’s social skills, such as their relationship building, and the development of a strong sense of community. Social skills were identified as one of the key benefits of the outdoor experience.
- *Encouraging youth with exceptionalities to learn by trying new things, discovering strengths and challenging themselves in physical and artistic activities* – interviewees described learning activities in the camp as more fun and informal than classroom studies; giving children an opportunity to learn about, and connect with the natural world; and building self-esteem and self-confidence.

Although this study was qualitative, and did not attempt to verify any of the conclusions with the children themselves, it is nevertheless one of the few studies where an attempt has been made to gain an insight into the benefits of outdoor experiences for children with autism and related disorders.

In a related study, Schreiber (2009) looked at the effects of a four day therapeutic adventure on the personal growth and social development of four students (15-18 years old) with Asperger’s Syndrome or high functioning autism. This is a group where support for social skills strategies is still minimal (Rao *et al.*, 2008). Through detailed observations and interviews with the students, Schreiber identified significant opportunities for personal and social growth. The adventure allowed the students to experience social success, resulting in a rise in self-perception of social competency and an increase in pro-social interaction. The adventure also resulted in new and long-lasting friendships. This study provides good initial evidence to support the notion that therapeutic adventures can help improve the social skills of children at the higher functioning end of the autistic spectrum. The author suggests that other camps may have further evidence of the efficacy of camps for children with autism, but the information is rarely analysed or published.

Although there are far fewer summer camps in the UK, Fox and Avramidis (2003) carried out a study in Southwest England, with children experiencing emotional and behavioural difficulties, some of whom may have had diagnoses of autism. Two groups of children from Year 9 and Year 10 were observed during and after an outdoor education programme; staff and children were also interviewed. Activities taking place over a six week period (one session per week) included walking on the moors (orienteering), climbing and outdoor rescue. The programme was successful in promoting both positive behaviour and academic gains for most pupils, leading to a positive perception of outdoor education amongst both pupils and staff. Benefits to the pupils included gains in affective and cognitive domains, with the potential to increase self esteem, behaviour and effective learning. The authors described outdoor education as “a powerful,

albeit underused tool in the education of young people deemed to experience emotional and behavioural difficulties”.

## 7.6 Physical exercise

Another potential context for autistic children’s engagement with the natural environment is through physical exercise and recreation. Sowa and Meulenbroek (2012) undertook a meta-analysis of 16 behavioural studies, involving 133 individuals in structured physical activities, both indoors and outdoors, in either an individual or group context. Outdoor activities included walking, jogging and horse riding. None of the studies directly relate to the restorative value of the natural environment. Furthermore, the analysis did not differentiate between indoor activities such as weight lifting, and outdoor activities such as horse riding. Overall, positive effects were reported in motor and social deficits, but data for communication skills were insufficient to be analysed.

Todd and Reid (2006) investigated the outcomes of two physical activities, snowshoeing and walking/jogging in a local park. Three non-verbal adolescents with severe autism (15 to 20 years) were studied over a six month period. One of the key criteria for selecting the students was the belief that they would benefit from outdoor experiences. All used edible reinforcement and verbal cuing consistent with classroom practices. A self monitoring board was used by the students. Walking/jogging was deemed particularly suitable because children with autism often have poorer motor skills than children without disabilities (Berkeley *et al.*, 2001). Sessions were limited to 30 minutes to ensure that motivation levels did not decrease. The target walking rate was 4.8 km/hr. The authors commented that the students became more independent as the activity progressed, with the elimination of edible reinforcers and a reduction in verbal cues. The authors speculated on possible reasons for the students’ motivation, including internal motivation, enhanced physical fitness and self monitoring. In addition to the effects on physical health, the programme may also have benefited the psychological well-being of the students, although this was not considered by the researchers.

More recently O’Brien (2010) described a seven week alpine skiing programme run by Outdoors for All Foundation and the behaviour of three boys with autism (8-10 years old). Using the Sensory Processing Measure to assess sensory-based behaviours, she looked at parental expectations, and the extent to which their hopes were fulfilled. All parents reported benefits, including: less intense challenging behaviours; higher self-esteem; increased familial interaction and participation in other recreational activities; and greater independence.

Finally, Brewster and Coleyshaw (2010) have provided some early insights into autistic children’s experiences of accessing and engaging in leisure activities (a topic which, they report, has rarely featured in the literature, due possibly to the broad spectrum of the condition and the communication difficulties associated with it). These authors undertook a small-scale investigation of 20 school-aged children with autism, some with additional ADHD. Although a wide range of pursuits were mentioned, most related to indoor ‘screen’ activities or playing in

the garden. There was little mention of visiting and/or playing in the natural environment. Interestingly, though, when asked what activities they would like to pursue, some of the younger children referred to adventure playgrounds, adventures in the woods, horse riding and going to the beach. The enthusiasm of young children to want to try new things was not apparent in older children. The study though did not include a control, and discussion groups relied on a 'one off encounter'.

## 7.7 Farm experiences

Care farming is defined as 'the use of commercial farms and agriculture landscapes as a base for promoting mental and physical health, through normal farming activity' (Hine *et al.*, 2008a). Health, social or educational care services may be provided by farmers for a wide range of vulnerable people, in partnership with health and social care providers. Target groups include people suffering from depression, psychiatric illness, drug problems and young offenders (Hine *et al.*, 2008a; Sempik *et al.*, 2010). In a survey of people attending care farms, it was reported that the majority of care farms (87%) cater for people with learning difficulties; within one category of farm – farms linked to other organisations – people with autism represented the second most common client group (Hine *et al.*, 2008b).

Only one registered care farm in the UK is known to specialise in caring for people with autism and Asperger's Syndrome (Otter, 2011; Lydia Otter, pers com). This farm on the Oxfordshire/Wiltshire border runs an organic herd of cattle, has other livestock and includes a County Wildlife Site. The farm is open to young people with autism 5-6 days a week, for 48 weeks of the year. The farm offers young people from 13 to 27 years a wide variety of real work opportunities, including animal husbandry, conservation work on wetland habitats, tree planting etc. In 2011, the farm worked with 30 young people between the ages of 13 and 27 years. Otter (2011) commented that the peaceful nature of the farm, the wide open spaces and views help to reduce anxiety amongst the young people. Walks use gates to learn about waiting, and enclosed meadows offer a sense of "safe containment" for the young people. Gardens have been designed to encourage feelings of calmness and contentment. Otter points out that daily and seasonal rhythms provide predictable routines – diaries show young people what tasks need to be performed on the farm, and how these change with the seasons, helping to reduce the 'fear' of change. Young people gain exercise through meaningful activities such as animal care and wood work. Many tasks teach the young people about teamwork. Others have commented that the project has had a tremendous impact on the lives of many people with autism (Otter, 2011). All care farms offer some form of ecotherapy, such as animal husbandry, gardening or woodland management, combined with some element of care. Some farms focus closely on the care element and have little involvement in commercial agriculture, whilst others are working farms, focusing more on primary production. Farms which offer these services may be formally registered as 'care farms' with Care Farming UK. Care farms are funded in a variety of different ways, enabling some to offer their services for free, whilst others charge.

Care farms are becoming increasingly popular in the Netherlands for short breaks, and many offer therapy to children with autism. It is currently estimated that around two thirds of the 600

or so care farms offered opportunities for children with autism (information from the Dutch national organisation for care farms website [www.zorgboeren.nl](http://www.zorgboeren.nl), cited in Ferwerda-van Zonneveld *et al.* 2012). However, Ferwerda-van Zonneveld *et al.* commented that there have been no published studies on these care farms, to identify how they can be of most benefit to children with autism. A preliminary study involving semi-structured interviews with seven care farmers, highlighted the importance of ‘the farmer’ to the children, as he/she offers structure, clarity and predictability to visits; a safe, secure farm environment which offers space, tranquillity and rhythm; and the care of animals, which are an essential element of the care farm experience. However, the study was narrow in terms of the number of farmers interviewed, and children were not interviewed or observed. Furthermore, Ferwerda-van Zonneveld’s study highlighted farmers’ concerns that they did not have sufficient knowledge of autistic spectrum disorders, and would benefit from some form of training; and because of the perceived benefits of care farming for children with autism, they felt under pressure to expand their care programmes to meet the increasing demand.

## 7.8 Animal therapy

A wide range of studies have been published on the inclusion of animals in therapeutic activities for people with autism (extensively reviewed in O’Haire, 2012). The majority of these involve horses or dogs. Whilst animal-assisted therapy is outside the remit of this report, some therapies take place in the natural environment, and contribute to the overall experience. This is particularly true for equine therapies in rural settings, and the care for farm animals. Although equine therapies have been in use since the 1950s, most research has focussed on hippotherapy for people with physical disabilities (Gabriels *et al.*, 2012). In recent years, several studies have examined the potential for children with autism (e.g. King, 2007; Bass *et al.*, 2009).

King (2007) studied a programme of outdoor therapeutic horse riding with five children with autism, and reported improvements in social skills, eye contact, expressive communication and willingness to try new things. Bass *et al.* (2009) worked with 19 children (aged five to ten years), and reported that parents noted significant improvements in their social responsiveness and sensory profile. Gabriels *et al.* (2012) undertook a quantitative and systematic assessment of the benefits of 10 weekly sessions of therapeutic horse riding for 42 children with autism (6 to 16 years). Their findings indicate significant improvement in participants’ self-regulation behaviours, related to the therapy. However, it is not clear how many of sessions were indoors, and how many were outdoors. With all of this work, though, it is important to recognise its early stage of development. O’Haire (2012), for example, makes clear that animal-assisted therapy for autistic people is in the “first phase of research on new psychosocial interventions for ASD – proof of concept”. She notes that published studies provide “preliminary support for the concept of AAI [animal-assisted therapy] for some individuals with ASD”, but that further, more rigorous research is required.

## 7.9 Nature experiences for children with ADHD

Attention Deficit/Hyperactivity Disorder (ADHD) is a condition that makes people inattentive, impulsive and hyperactive. It is one of the most common psychiatric disorders of children and young people, and affects between 2% and 7% of children worldwide (Bruchmüller *et al.*, 2012). According to the National Autistic Society, an increasing number of children have been diagnosed with both ADHD and autism; whilst young children may show symptoms of both conditions, as they grow older, children with autism tend to become calmer whilst those with ADHD continue to exhibit the classic symptoms of hyperactivity. It is the second most common disorder in people diagnosed with autism (Simonoff *et al.*, 2008). Children with ADHD are less likely to show the same degree of anxiety as those with autism, and some may have no difficulties with social and communication skills, in contrast to children with autism.

In the USA, ADHD is associated with poor performance in schools and low rates of high school graduation and postsecondary education (Barkley, 1997; Loe and Feldman, 2007). A significant number of children with ADHD also suffer from impairments in social functioning, having a diminished capacity for social interaction with their peers, for example lacking any comprehension for how their actions might impact others (Nijmeijer *et al.*, 2008). These features are similar to those exhibited by children on the autistic spectrum. More work has been undertaken on ADHD symptoms in children with autism, and some children diagnosed with autism can be hyperactive (Nijmeijer *et al.*, 2008). They can also have short attention spans and be impulsive. These 'core' ADHD traits are noted as features of autism by the DSM-IV. But the role of these comorbid symptoms remains a contentious issue, and the nature of the symptom overlap between ADHD and autism requires further study (Gargaro *et al.*, 2011). Currently, a combined diagnosis of autism and ADHD is precluded by DSM-IV and the International Classification of Diseases (ICD-10). ADHD cannot be diagnosed in the presence of autism. In their pure forms, the medical profiles of autism and ADHD are evident, but in their comorbid form, the appearance of the disorders is far from clear. Consequently, in the context of this review, it is pertinent to consider studies which have also looked at the therapeutic benefits of the natural environment for children with ADHD. Furthermore, ADHD has been the focus of considerably more research in this area, than autism.

Early work published by Faber Taylor and colleagues in the USA demonstrated that children playing in green spaces exhibited less severe symptoms than during similar play sessions in hard landscapes. (Faber Taylor *et al.*, 2001; Kuo and Faber Taylor, 2004). Faber Taylor stated that "contact with nature may support attentional functioning in a population of children who desperately need attentional support" (Faber Taylor *et al.*, 2001). Activities in green spaces were also shown to benefit many subpopulations, including children with and without hyperactivity; and across many settings (urban green space and rural green space) and regions of the US (Faber Taylor *et al.*, 2001; Kuo and Faber Taylor, 2004). The implication of these studies was that time spent in green spaces might reduce symptoms of ADHD across a wide range of activities, in a wide range of green settings, and for children of differing ages. Faber Taylor also investigated the effects of relatively isolated 'doses' of nature, comparing 20 minute walks through a park, with walks through less green settings. It was found that children with

ADHD performed significantly better after walks in the park, exhibiting higher levels of concentration than after walks in the other settings. The suggestion was made that ‘doses’ of nature might serve as a safe, inexpensive and easily accessible tool for managing ADHD (Faber Taylor and Kuo, 2009). Other workers have reported more consistent higher levels of functioning of children with ADHD in woodland, compared to urban settings (Van Den Berg and Van Den Berg, 2010).

However, Faber Taylor’s studies did not examine the effects of the frequency of visits to green space, and how this impacts on the symptoms of children with ADHD. More recently, Faber Taylor and Kuo (2011) showed that the settings for everyday play influence symptom severity in children with ADHD. This was based on parental ratings of the severity of their child’s symptoms. Regular play in green settings was found to consistently induce milder ADHD symptoms than play in hard landscapes or indoors. For particularly hyperactive children with ADHD, the benefits of green space were only apparent for particularly ‘open’ settings. These children typically exhibit strong impulses for large motor movement. No significant reduction in symptoms was noted for this group in areas categorised as ‘big trees and grass’; only open grassy areas were beneficial. Interestingly, Faber Taylor and Kuo speculated on the possibility that many children with ADHD may self-medicate in their choice of play settings; based on their findings that, in contrast to neurotypical children, the majority of children with ADHD play outdoors.

The case for regular engagement with the natural environment for children with ADHD is compelling, but further research is required. Faber Taylor and Kuo point out that their recent study (Faber Taylor and Kuo, 2011) did not address the activities undertaken by the children when in natural places, although significant effects of setting were reported in earlier studies, even when activities remained constant (Faber Taylor *et al.*, 2001; Faber Taylor and Kuo, 2009). The studies undertaken by Faber Taylor and colleagues confirm the importance of easily accessible green space, for both children with ADHD and neurotypical children (Faber Taylor and Kuo, 2006), supporting healthy development in many different ways. Based on this evidence, it seems reasonable to suppose that children on the autistic spectrum might also benefit from regular visits to easily accessible green space. Indeed, Faber Taylor and Kuo suggest regular doses of green space might, in the case of children with ADHD, be a valuable supplement to medication and behavioural treatments.

## **7.10 Summary of studies of autistic children**

Autism is a complex, lifelong condition, with difficulties in social communication, social skills and social imagination. Over half a million people are thought to have autism in the UK, and cases have been rising steadily since the 1970s, with a significant rise during the first decade of the 21<sup>st</sup> century. Despite the growing prevalence of autism, there is a definite lack of high quality, published research on the impacts of engaging children on the autistic spectrum with the natural environment.

That said, some evidence supporting the notion that engaging with the natural environment benefits children with autism can be found in various studies of: outdoor learning activities; gardening and horticulture; landscape design; summer camps; physical exercise; and farm experiences. However, some of these relate to groups of children with SEN, including children with autism. The most comprehensive study cited concerned animal-assisted therapy. ADHD is the second most common disorder in people diagnosed with autism, and studies focused on this condition provide strong evidence for the benefits of regular engagement with the natural environment for children with ADHD.

## 8. Conclusions from Evidence Review

This section summarises the key findings of the evidence review study, and presents a series of implications for future practice, policy and research.

### 8.1 Key Findings

The main findings of this evidence review can be summarised as follows:

**1. The current evidence on the benefits of engaging children on the autistic spectrum with the natural environment is very limited.** While there are many peer reviewed studies to demonstrate the benefits of engaging people in general with the natural environment, the same cannot be said for children on the autistic spectrum.

**2. Having said that, this does not mean that there is a complete absence of any research-based evidence concerning autistic children and the natural environment.** Some, typically small-scale, studies have been undertaken on outdoor activities with autistic children (e.g. animal therapy, gardening projects, summer camps, field visits). Useful insights can also be drawn from wider but related literatures (e.g. studies of outdoor learning with children in general, and work with children with SEN, disabilities and ADHD).

**3. It seems reasonable to conclude on the basis of the current evidence that engagement with the natural environment can be beneficial for children on the autistic spectrum.** This reflects the fact that: (i) there is strong evidence that outdoor activities can benefit children in general; (ii) there is considerable evidence that outdoor learning is particularly helpful for children with SEN who often face more difficulties with classroom learning and greater barriers to accessing the outdoors; and (iii) there is some evidence showing autistic children benefiting from initiatives such as gardening projects, summer camps, field visits and animal therapy.

**4. It is also clear, however, that research-based understandings of many aspects of autistic children's engagement with the natural environment are yet to develop.** While some information is available about how certain aspects of outdoor settings might help autistic learners, there is generally very little known about how different kinds of experiences in the natural environment can be more or less beneficial for different children across the autistic spectrum.

### 8.2 Implications

This evidence review suggests that:

**1. Outdoor learning in the natural environment for children with autism deserves further consideration and investigation by practitioners, policy makers and researchers.** It is

important that any future developments embrace the full range of autistic learners, and encompass outdoor activities connected with schools, families and communities. It is also crucial that practical initiatives are as much about using and generating evidence as developing practice. In other words, research-informed approaches and evaluation need to be at the heart of future outdoor learning projects with autistic children.

**2. The evidence base on autistic children and the natural environment needs strengthening.**

This has implications for educational researchers working on outdoor learning, disability researchers exploring therapeutic approaches and natural environment researchers studying use of the outdoors. Autistic children and young people have been notable by their absence in much of the discussion within these different research fields. There is a clear need for more and better research into autistic children and their outdoor learning in the natural environment.

**3. Future research needs to address the fact that little is known about the outdoor activities and circumstances that are most appropriate for different kinds of autistic learners.**

Researchers need to be mindful of the fact that autism is a complex condition, and whilst most people with autism share what are often referred to as the 'triad of impairments', individuals have very different combinations of symptoms and vary widely in ability and personality. Any research programme therefore needs to investigate how to effectively engage autistic children with the natural environment, right across the autistic spectrum. Such a programme may be undertaken in the context of school learning, to develop sustainable, evidence-informed models to help schools develop their own engagement programmes in the future.

## References

- Barkley, RA. (1997). Behavioural inhibition, sustain attention, and executive functions: constructing a unifying theory of ADHD. *Psychological Bulletin* 121, 65-94.
- Bass, MM., Duchowny, CA. & Llabre, MM. (2009). The effect of therapeutic horseback riding on social functioning in children with autism. *Journal of Autism and Developmental Disorders* 39, 1261-1267.
- Berkeley, SL., Zittel, LL., Pitney, LV. & Nichols, SE. (2001). Locomotor and object control skills of children diagnosed with autism. *Adapted Physical Activity Quarterly* 18, 405-416.
- Bingley, A. & Milligan, C. (2004). 'Climbing trees and building dens' *Mental health and well-being in young adults and the long-term effects of childhood play experience*. A study for the Forestry Commission.
- Bird, W. (2007). *Natural thinking*. A Report for the RSPB.
- Blakesley, D. & Payne, S. (2012). *Visiting the Kent countryside: a guide for parents of children with autism*. Autism and Nature: Maidstone.
- Blakesley, D. & Blakesley, T. (2013) *Visiting the East Sussex countryside: a guide for families, children and young people with autism*. Autism and Nature: Maidstone.
- Botanic Gardens Conservation International. (2010). *Towards a new social purpose: redefining the role of botanic gardens*. Botanic Gardens Conservation International: Richmond.
- Botanic Gardens Conservation International. (2011). *Growing the social role: partnerships in the community*. Botanic Gardens Conservation International: Richmond.
- Boyd, CM., Fraiman, JL., Hawkins, KA., Labin, JM., Sutter, MB. & Wahl, MR. (2008). Effects of the STAR Intervention Program on interactions between campers with and without disabilities during inclusive summer day camp activities. *Education and Training in Developmental Disabilities* 3, 92-101.
- Brewster, S. & Coleyshaw, L. (2010). Participation or exclusion? Perspectives of pupils with autistic spectrum disorders on their participation in leisure activities. *British Journal of Learning Disabilities* 39, 284-291.
- Brookman, L., Boettcher, M., Klein, E., Openden, D., Koegel, RL. & Koegel, LK. (2003). Facilitating social interactions in a community summer camp setting for children with autism. *Journal of Positive Behaviour Interventions* 5, 249-252.

Bruchmüller, K., Margraf, J. & Schneider, S. (2012). Is ADHD diagnosed in accord with diagnostic criteria? Over diagnosis and influence of client gender on diagnosis. *Journal of Consulting and Clinical Psychology* 80, 128-138.

Burls, AP. (2008). Seeking nature: a contemporary therapeutic environment. *Therapeutic Communities* 29, 228-244.

Burt, J., Stewart, D., Preston, S. & Costley, T. (2013). *Monitor of Engagement with the Natural Environment Survey (2009 -2012): Difference in access to the natural environment between social groups within the adult English population*. Natural England Data Reports, DATA003.

Chang, Y-Y. & Chang C-Y. (2010). *The benefits of outdoor activities for children with autism*. 16<sup>th</sup> International Symposium on Society and resource Management. Corpus Christi: Texas.

Coughlan, R. & Blakey, JB. (2012). *Nature and physical activity at camp: a qualitative ecopsychological study*. Thesis presented to Trent University, USA.

De Bruin, SR., Oosting, SJ., Kuin, Y., Hoefnagels, ECM., Blauw, YH., De Groot, LCPGN. & Schols, JMGA. (2009). Green care farms promote activity among elderly people with dementia. *Journal of Housing for the Elderly* 23, 368-389.

Defra. (2011). *The Natural Choice: securing the value of nature*. The Stationary Office.

Dillon, J. (2011). *Understanding the diverse benefits of learning in natural environments*. [Online] Available: [www.lotc.org.uk/wp-content/uploads/2011/09/KCL-LINE-benefits-final-version.pdf](http://www.lotc.org.uk/wp-content/uploads/2011/09/KCL-LINE-benefits-final-version.pdf)

Dillon, J. & Dickie, I. (2012). *Learning in the natural environment: review of social and economic benefits and barriers*. Natural England: London.

Dillon, J., Rickinson, M., Teamey, K., Morris, M., Choi, MY., Sanders, D. & Benefield, P. (2006). The value of outdoor learning: evidence from research in the UK and elsewhere. *School Science Review* 87, 107-111.

Dominguez LA. & Schilling, ML. (2001). Environmental awareness and outdoor recreation: a pilot program for people with special needs. *World Leisure Journal* 43, 42-47.

Dunn, K. & Moore, M. (2005). Developing accessible play space in the UK: a social model approach. *Children, Youth and Environments* 15, 331-353.

Eftec. (2011). *Assessing the benefits of learning outside the classroom in natural environments*. Final Report for King's College: London.

England Marketing. (2009). *Report to Natural England on Childhood and Nature: a survey of changing relationships with nature across generations*. Cambridge: England.

Etherington, E. (2012). *Gardening for children with autism spectrum disorders and special educational needs: engaging with nature to combat anxiety, promote sensory integration and build social skills*. Jessica Kingsley Publishers.

Faber Taylor, A. & Kuo, FE. (2006). *Is contact with nature important for healthy child development? State of the evidence*. In Spencer, C and Blades, M (Eds). *Children and their environments: Learning, using, and designing spaces*. Cambridge University Press: Cambridge. Pp 124-140.

Faber Taylor, A. & Kuo, FE. (2009). Children with attention deficits concentrate better after walk in the park. *Journal of Attention Disorders* 12, 402–409.

Faber Taylor, A., Kuo, FE. & Sullivan, W. (2001). Coping with ADD: The surprising connection to green play settings. *Environment and Behavior* 33, 54–77.

Faber Taylor, A. & Kuo, FE. (2011). Could exposure to everyday green spaces help treat ADHD? Evidence from children's play settings. *Applied Psychology: Health and Well-Being* 3, 281-303.

Farley, MA., McMahon, WM., Fombonne, E., Jenson, WR., Miller, J., Gardner, M, Block, H., Pingree, CB., Ritvo, ER., Ritvo, AR. & Coon, H. (2009). Twenty-year outcome for individuals with autism and average or near-average cognitive abilities. *Autism Research* 2, 109-118.

Farnham, M. & Mutrie, N. (1997). The potential benefits of outdoor development for children with special needs. *British Journal of Special Education*, 24, 31–8.

Ferwerda-van Zonneveld, RT., Oosting, SJ. & Kijlstra, A. (2012). Care farms as a short-break service for children with Autism Spectrum Disorders. *NJAS – Wageningen Journal of Life Sciences* 59, 35-40.

Fox, P. & Avramidis, E. (2003). An evaluation of an outdoor education programme for students with emotional and behavioural difficulties. *Emotional and Behavioural Difficulties* 8, 267-283.

Gabriels, RL., Agnew, JA., Holt, KD., Shoffner, A., Zhaoxing, P., Ruzzano, S., Clayton, GH. and Mesibov, G. (2012). Pilot study measuring the effects of therapeutic horseback riding on school-age children and adolescents with autism spectrum disorders. *Research in Autistic Spectrum Disorders* 6, 578-588.

Gargaro, BA., Rinehart, NJ., Bradshaw, JL., Tonge, BJ. & Sheppard, DM. (2011). Autism and ADHD: how far have we come in the comorbidity debate? *Neuroscience & Biobehavioral Reviews* 35, 1081-1088.

Healey, M., Jenkins, A., Leach, J. & Roberts, C. (2001). *Issues in Providing Learning Support for Disabled Students Undertaking Fieldwork and Related Activities*. [online]. Available:

[www-](http://www-new1.heacademy.ac.uk/assets/Documents/subjects/engineering/learning_support_disabled.pdf)

[new1.heacademy.ac.uk/assets/Documents/subjects/engineering/learning\\_support\\_disabled.pdf](http://www-new1.heacademy.ac.uk/assets/Documents/subjects/engineering/learning_support_disabled.pdf)

Herbert, BB. (2003). *Design guidelines of a therapeutic garden for autistic children*. Thesis submitted to Louisiana State University.

Hine, R., Peacock, J. & Pretty, J. (2008a). Care farming in the UK: contexts, benefits and links with therapeutic communities. *Therapeutic Communities* 29, 245-260.

Hine, R., Peacock, J. & Pretty, J. (2008b). *Care farming in the UK: evidence and opportunities*. Report for the National Care Farming Initiative (UK).

Hussein, H. (2010). The influence of sensory gardens on the behaviour of children with special educational needs. *Asian Journal of Environment-Behaviour Studies* 2 , 77-93.

John, A. & Wheway, R. (2004). *Can play will play: disabled children and access to outdoor playgrounds*. National Playing Fields Association: London.

Kaplan, S. (1995). The restorative benefits of nature: toward an integrative framework. *Journal of Environmental Psychology* 15, 169-182.

King, N. (2007). *Perceived efficacy of therapeutic riding for children with autism*. In: Engle, B and MacKinnon (Eds). *Enhancing human occupation through hippotherapy*. American Occupational Therapy Association. Pp 119-126.

Kobayashi, R. & Murata, T. (1977). A consideration of the effectiveness of therapeutic camping for autistic children. *Japanese Journal of Child Psychiatry* 18, 221-234. English summary.

Kuo, FE. & Faber Taylor, A. (2004). A potential natural treatment for attention-deficit/hyperactivity disorder: Evidence from a national study. *American Journal of Public Health* 94, 1580–1586.

Lang, R., Koegel, LK., Ashbaugh, K., Regester, A., Lacey, W. & Smith, W. (2010). Physical exercise and individuals with autism spectrum disorders: A systematic review. *Research in Autism Spectrum Disorders* 4, 565-576.

Loe, IM. & Feldman, HM. (2007). Academic and educational outcomes of children with ADHD. *Journal of Pediatric Psychology* 32, 643–654.

Logan, AC. & Selhub, EM. (2012). *Vis Medicatrix naturae*: does nature “minister to the mind”? *BioPsychoSocial Medicine* 6, 11.

Moss, S. (2012). *Natural childhood*. National Trust.

Nature Editorial. (2011). The mind's tangled web. *Nature* 479, 5.

Nijmeijer, JS., Minderaa, RB., Buitelaar, JK., Mulligan, A., Hartman, CA. & Hoekstra, PJ. (2008). Attention-deficit/hyperactivity disorder and social dysfunctioning. *Clinical Psychology Review* 28, 692–708.

O'Brien, K. (2010). *The effect of alpine skiing on behaviour of children with an autism spectrum disorder as viewed by their parent*. Thesis presented to University of Puget Sound.

O'Haire, ME. (2012). Animal-assisted intervention for autism spectrum disorder: a systematic literature review. *Journal of Autism and Developmental Disorders*, online.

Otter, L. (2011). Pennyhooks farm: providing rewarding and meaningful opportunities for young adults on the autism spectrum. *GAP* 12, 75-78.

Passy, R. (2012). School gardens: teaching and learning outside the front door. *Education* 3, 1-16.

Peacock, J., Hine, R. & Pretty, J. (2007). *Got the Blues? Then find some greenspace: The mental health benefits of green exercise activities and green care*. University of Essex report for Mindweek.

Pretty, J., Griffin, M., Peacock, J., Hine, R., Sellens, M. & South, N. (2005). *A countryside for health and well-being: the physical and mental health benefits of green exercise*. Report for the Countryside Recreation Network.

Pretty, J., Peacock, J., Hine, R., Sellens, M., South, N. & Griffin, M. (2007). Green exercise in the UK countryside: Effects on health and psychological well-being, and implications for policy and planning. *Journal of Environmental Planning and Management* 50, 211-231.

Price, R. & Stoneham, J. (2001). *Making connections: a guide to accessible greenspace*. Sensory Trust: Bodelva.

Rao, PA., Beidel, DC. & Murray, MJ. (2008). Social skills interventions for children with Asperger's Syndrome or high-functioning autism: a review and recommendations. *Journal of Autism Developmental Disorders* 38, 353-361.

Rickinson, M. (2010). *Growth through growing – students with special education needs*. DCSF/Growing Schools Case Study Report.

Rickinson, M., Dillon, J., Teamey, K., Morris, M., Choi, MY., Sanders, D. & Benefield, P. (2004). *A review of research on outdoor learning*. National Foundation for Educational Research and King's College London.

Rickinson, M., Hunt, A., Rogers, J. & Dillon, J. (2012). *School leader and teacher insights into learning outside the classroom in natural environments*. Natural England: London.

Royal Horticultural Society. (2010). *Growing together: gardening with children and young people with Special Educational Needs*. Royal Horticultural Society: Wisley.

Royal Horticultural Society. (2012). *Moving up, growing on: Gardening for a better future*. Royal Horticultural Society: Wisley.

Sanders, D., Duemler, J. & Hartman, E. (2009). Nature of experience: engaging special needs learners through the natural world. *Practical Research for Education* 42, 56-63.

Sachs, N. & Vincenta, T. (2011). Outdoor environments for children with autism and special needs. *Implications* 9, 1-8.

Schreiber, C. (2009). *Effects of therapeutic outdoor adventure on the social competency of gifted adolescents with Asperger's Syndrome or high functioning autism*. Dissertation for the University of Georgia.

Sempik, J., Hine, R. & Wilcox, F (eds). (2010). *Green care: a conceptual framework*. A report of the Working Group on the health benefits of green care. Cost 886.

Shelley, P. (2002). *Everybody here? Play and leisure for disabled children and young people: A Contact a Family survey of families' experiences in the UK*. Contact a Family: London.

Simonoff, E., Pickles, A., Charman, T., Chandler, S., Loucas, T. & Baird, G. (2008). Psychiatric disorders in children with autism spectrum disorders: prevalence, comorbidity, and associated factors in a population-derived sample. *Journal of the American Academy of Child & Adolescent Psychiatry* 47, 921-929.

Singer, E. (2012). Redefining autism. *Nature* 491, 512-513.

Sowa, M. & Meulenbroek, R. (2012). Effects of physical exercise on autism spectrum disorders: a meta-analysis. *Research in Autism Spectrum Disorders* 6, 46-57.

State, MW. & Levitt, P. (2011). The conundrums of understanding genetic risks for autism spectrum disorders. *Nature Neuroscience* 14, 1499-1506.

Tabbush, P. & O'Brien, E. (2003). *Health and well-being: Trees, woodlands and natural spaces*. Forest Research: Farnham.

Thomas, G. & Thompson, G. (2004). *A child's place: why environment matters to children*. DEMOS and Green Alliance. [Online] Available: [www.green-alliance.org.uk/uploadedFiles/Publications/A%20Childs%20Place%20Final%20Version.pdf](http://www.green-alliance.org.uk/uploadedFiles/Publications/A%20Childs%20Place%20Final%20Version.pdf)

Todd, T. & Reid, G. (2006). Increasing physical activity in individuals with autism. *Focus on Autism and other Developmental Disabilities* 21, 167-176.

Van Den Berg, AE. & Van Den Berg, CG. (2010). A comparison of children with ADHD in a natural and built setting. *Child: care, health and development* 37, 430-439.

von Benzon, N. (2010). Moving on from ramps? The utility of the social model of disability for facilitating experiences of nature for disabled children. *Disability & Society* 25, 617-626.

Weintraub, K. (2011). Autism counts. *Nature* 479, 22-24.

Wilson, B. & Johnson, L. (2007). Therapeutic gardens for children with autism spectrum disorders. Abstract in: *Negotiating Landscapes*. Penn State.

Woolley, H. (2012). Now being social: the barrier of designing outdoor play spaces for disabled children. *Children & Society*, online.

Woolley, H., Pattacini, L. & Somerset-Ward, A. (2009). *Children and the natural environment: experiences, influences and interventions – summary*. Natural England: London.

## Endnotes

<sup>1</sup> [www.lotc.org.uk/sitemap/](http://www.lotc.org.uk/sitemap/)

<sup>2</sup> [www.publications.parliament.uk/pa/cm200910/cmselect/cmchilsch/418/418.pdf](http://www.publications.parliament.uk/pa/cm200910/cmselect/cmchilsch/418/418.pdf)

<sup>3</sup> [www.dragonflyforest.org/about-us/summer-autism-program-video](http://www.dragonflyforest.org/about-us/summer-autism-program-video)