



**Scotland's
National Nature
Reserves**

Magical places, amazing wildlife.

Peatlands

A Guide to Educational Activities for Schools



Scottish Natural Heritage
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2 April 2014



**Scottish Natural Heritage
Dualchas Nàdair na h-Alba**

All of nature for all of Scotland
Nàdar air fad airson Alba air fad

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Terms of Reference

Peatlands - A Guide to Educational Activities for Schools is written for the Primary School sector and contains references to the Curriculum for Excellence (CfE). The guide is designed to be used by teachers to run themed projects on peat and peatlands. Resources can be used to plan projects and/or site visits. Some of the resources listed are advanced which makes the guide useable in the Secondary Schools.

Outdoor learning, used in a range of ways, will enrich the curriculum and make learning fun, meaningful and relevant for children and young people.

Curriculum for Excellence through Outdoor Learning

Executive Summary

Many schools across Scotland will have access to a peatland site, and a themed study can be enhanced by a visit to one of these sites. This guide will point teachers to fully developed ideas for implementing the CfE using peatlands and to where they can gather the information they need to plan site visits for groups. To this end, Blawhorn Moss National Nature Reserve has been used as a case study to highlight potential activities that can be undertaken on a site.

The project team worked with teachers at Blackridge Primary School to examine the Curriculum for Excellence (CfE) in order to identify where a peatland theme would be relevant within the curriculum. Blackridge Primary School is just a few miles from Blawhorn Moss NNR.

The theme of 'Peat' links into many aspects of the CfE and the cultural and landscape change which has occurred in peatlands gives a valuable outlook on how land use and people's perceptions have changed over time. The current sustainability agenda also lends itself to discussion about carbon locked in peat, peat extraction and sustainable fuels usage, including the long term viability of wind energy.

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Peatlands are one of Scotland's most important land resources, their careful management is essential for wildlife conservation, carbon sequestration and landscape quality. Scottish Natural Heritage has sponsored this guide for schools to improve knowledge of the importance of peatlands as a national asset and promote these sites as suitable education venues for outdoor learning.

The guide contains a Peatland Curriculum Map, in the form of a mind map. The map aims to stimulate practitioners and learners to think about peat and peatlands across the curriculum and

beyond. Within the guide there are five themes based around peat and one theme covering 'Core Knowledge' that all learners should find out when studying Peatlands.

Many of the resources can be used directly by learners, even at the primary level. Some of the resources are more appropriate for older learners and will need to be adapted for younger learners.

1. Introduction

The Scottish Government is keen to see all our children and young people having positive learning experiences in a variety of settings. This is why we are investing in the production and promotion of guidance to support opportunities presented by the new school curriculum for learning in the outdoors.

Curriculum for Excellence through Outdoor Learning

The 'Curriculum for Excellence through Outdoor Learning' sets out the opportunities for learners to grow and develop both as individuals and academically, when engaged in learning through the outdoors. This resource provides an opportunity for teachers to undertake positive outdoor experiences by providing resources and links on the theme of peat and peatlands.

Learners using this resource should gain an understanding of the national and international importance of Scottish peatlands, how they are protected and managed, and the economic and social benefits of their continued protection. Peatland types are discussed along with the challenges of categorising them into blanket bogs, mires, raised bogs, and many more.

When working with teachers at Blackridge Primary School, local to Blawhorn Moss, five themes were developed that can be taught to groups of learners. All the themes have the concept of a 'site visit' to the learner's local peatland as part of the work plan.

Five peatland themes:

- Mapping the Moss
- Special Places
- Landscape Change
- Sustainability
- Twinning and Technology

In addition to these, there is a section on Core Knowledge that all learners should investigate when studying peatlands. For teachers, the use of these peatland themes should enable them to see how their decisions may affect the future of their landscapes and cultural heritage in Scotland.

There is a wealth of internet based resources highlighted in the Resource Guide that gives a broad background into peat, peatlands and issues surrounding peat. It is intended that learners or teachers use the Resource Guide to find out information and data to support their chosen theme.

Natural systems are dynamic, they will change over time, but human influence will also alter the landscape and the pace of change. Some land use is unsustainable – cutting peat for horticulture for example. Changes of land use such as afforestation or urbanisation can modify the land cover (vegetation) and the layout of the land (drainage) to have a considerable impact on the landscape and the livelihood of people for generations to come. These changes can for instance trigger a

release into the atmosphere the carbon stored in our soils or increase flooding risks along river catchments.

Sustainable land uses can respond to social needs by addressing educational and recreational interests (through wildlife watching, walking and biking) or industrial ones by producing renewable energy where wind farms are carefully set.

In general all uses of the land have an impact on the landscape and in turn, on the wildlife value of an area. It is hoped the learner will develop an idea of this dynamic state, as the learners of today will be the decision makers of tomorrow.

Blawhorn Moss Nature Reserve has been used as a case study within this guide to highlight these principles. This NNR has facilities including a car park, site interpretation and boardwalks. It is anticipated that teachers can adapt the activities based at Blawhorn Moss to their local peatland site, or similar habitats and outdoor locations. Learners should undertake a 'Peatland Condition Assessment' of any site they visit; guidance for this is included in the Core Knowledge Theme.

Blawhorn Moss sits within, and is part of, the Central Scotland Green Network (CSGN). This network encourages the improvement of both the urban and rural environment and recognises that a good-quality environment promotes opportunities for a sense of well-being, a healthy lifestyle, and active travel (encouraging walking and cycling to school, shops or work instead of driving). Blawhorn Moss can be accessed by train from the railway station at Blackridge (about 1 mile away from the reserve) or by bike as the entrance to the Reserve is linked to National Cycle Route (NCN) Route 75 (Glasgow - Edinburgh). The reserve also has a car park to allow mini-bus access to the site.

Blawhorn Moss has National Nature Reserve (NNR) designation; it is an area of land set aside for nature, where the main purpose of management is the conservation of habitats and species of national and international significance. There are 47 NNRs in Scotland, and these are some of the best places for wildlife in the country. They also have a range of facilities, such as visitor centres, designed to enhance the visitor's enjoyment. SNH actively promotes all NNRs, which receive over three quarters of a million visits from the public annually. To promote these sites and others, SNH has sponsored the development of this activity guide to encourage teachers to develop peatland themes, potentially including site visits, with their learners.

Resources in this guide also give advice on risk assessment and site visit protocols for teachers. Welfare issues such as toilet facilities are mentioned in section 5. Responsibility of learners on site is highlighted in the Scottish Outdoor Access Code (SOAC), which encourages individuals, and groups to take responsibility for their own actions, respect the interests of other people and care for the environment.

2. Peatland Curriculum Map

The Peatland Curriculum Map is based around both Cultural (social & economic factors) and Natural (abiotic and biotic factors) elements and has been developed in the form of a mind map (appendix 1). It demonstrates the natural process of peatland development and the cultural links these areas have within the Scottish landscape. Peatlands have both direct and indirect economic and social benefits to society (recreation, biodiversity, flood prevention and carbon sequestration) if they are managed carefully and sustainably. However, in the past, management techniques and land use has damaged peatland areas (drainage, afforestation, peat cutting). Peatlands are a huge carbon sink in Scotland and if managed well, will continue to keep carbon locked in the ground. If peatlands are poorly managed and allowed to dry out, in simple terms, this carbon will be released to the atmosphere and will add to the potential for climate change.

Teachers can use the Peatland Curriculum Map to develop their own themes to deliver to learners or to see the broader issues affecting Peatlands. The map contains hyperlinks so teachers and learners can go directly to web resources to find out more about any given issue quickly.

Learning outdoors can be the educational context which encourages children and young people to make connections experientially, leading to deeper understanding within and between curriculum areas and meeting learner needs.

Curriculum for Excellence through Outdoor Learning

3. Peatland Project Themes

3.1 Introduction

The scientific aspects of peatlands were clearly recognised as teachers found the principles of vegetation succession, interactions between plants and animals, ecosystems and biodiversity quite straight forward. However, the teachers were excited about the potential to deliver 'social studies' aspects of the curriculum, linked to the topic of peatlands. Looking at how people have changed the landscape and land use over time, the effects of economic processes on the peatlands, threats to peatlands and peatland restoration, all supported the delivery of the 'People, Place and Environment', 'People and Society', and 'People and Past' areas of the curriculum.

This is reflected in the Peatland Themes described in this guide. There is not a large emphasis on biological processes (although the resources area will guide teachers to places this information can be found), but there is a greater emphasis on social interactions between peatlands, people and time.

It is assumed that each Peatland Theme will take around two hours per week for half a term. Of course, it can be guided by the learners who may enjoy a theme and want to spend more time working around it.

The Themes described are not in the form of activity sheets or lesson plans as it was felt that this would be too rigid for most teachers and learners. The Themes are in the form of mind maps that guide the learner into questioning key concepts and ideas that run through each theme and a table which links to the questions and activities that learners may be asked to cover during the theme.

Each of the five themes Mapping the Moss, Special Places, Landscape Change, Sustainability, Twinning and Technology begin with 'Knowledge Core'. The 'Knowledge Core' is a general guide giving background information to learners about peatlands in Scotland and their formation. This core knowledge about vegetation change, peat development and the timescale involved in making peat are essential building blocks for understanding the issues around peat and peatlands.

These themes are simply a guide to what can be delivered. By using the curriculum map a teacher can create their own theme, and using the resources section, work with learners to discover more.

3.2 Peatland Theme: Core Knowledge

This is the background information that learners will find helpful, giving the key information to investigate the themes effectively. 'Knowledge Core' (Figure 1) provides the essential information covering the formation of peatlands since the last ice age and the dynamic landscape that has evolved since glaciers left bare land for plants to colonise; the idea that peat formation takes time and that current vegetation growth is simply a stage in a wider process.

In one sense it is easy to define peatlands as areas of land consisting largely of peat or peat bogs. However the classification of peatlands is more difficult due the effects of topography, climate, geology and altitude. Hence a blanket bog found at sea level on the west coast of Scotland may occur at a high altitude on the east. Classic example of peatlands – raised bog, blanket bog, fens can

all be described but this is often simplistic. Even academics argue over the classification of peatland types.

Landscape changes over time. Ten thousand years ago there was a blank canvas left by the ice age, and vegetation began to recolonize the land. Each wave of vegetation succession changed the landscape from the bare ground condition left behind after the glacier retreated, to fen, raised bog, woodland and finally mature woodland. People altered the landscape and its vegetation by clearing woodlands, draining land for farming and extracting peat for fuel. As this change continued, it influenced the development and nature of settlements and the economy of a given area.

In the last century draining of peatlands continued, coniferous afforestation began, the use of peat for horticulture developed and these activities continued to change the landscape.

Examples of peat cores can be used to demonstrate the peatland timeline and the unique properties of peat that slow down decomposition. The theme should also discuss the uses of peat by people and the impact this has on peatlands.

The restoration of damaged peatland ecosystems relies on arresting the process of succession or changing previous land uses. To do this, land managers need to manage hydrological systems to keep the land wet and to control tree regrowth. Additionally, carbon is released if peatland sites dry out or are dug up; therefore what is the value of managing the land to prevent the release of carbon that is locked away in peat?

This guide encourages learners to visit a peatland to see how it is managed. Once on site, one way to assess site management and condition of the land is to carry out a 'peatlands condition assessment'. Learners can use a simple method shown in Table 1. Different land uses require different conditions for them to work. Managers of Highland Grouse Moors are trying to create different conditions to land managers of recreational areas. The site conditions should reflect the anticipated land use.

Table 1 - Simple On-site Peatland Condition Assessment Table

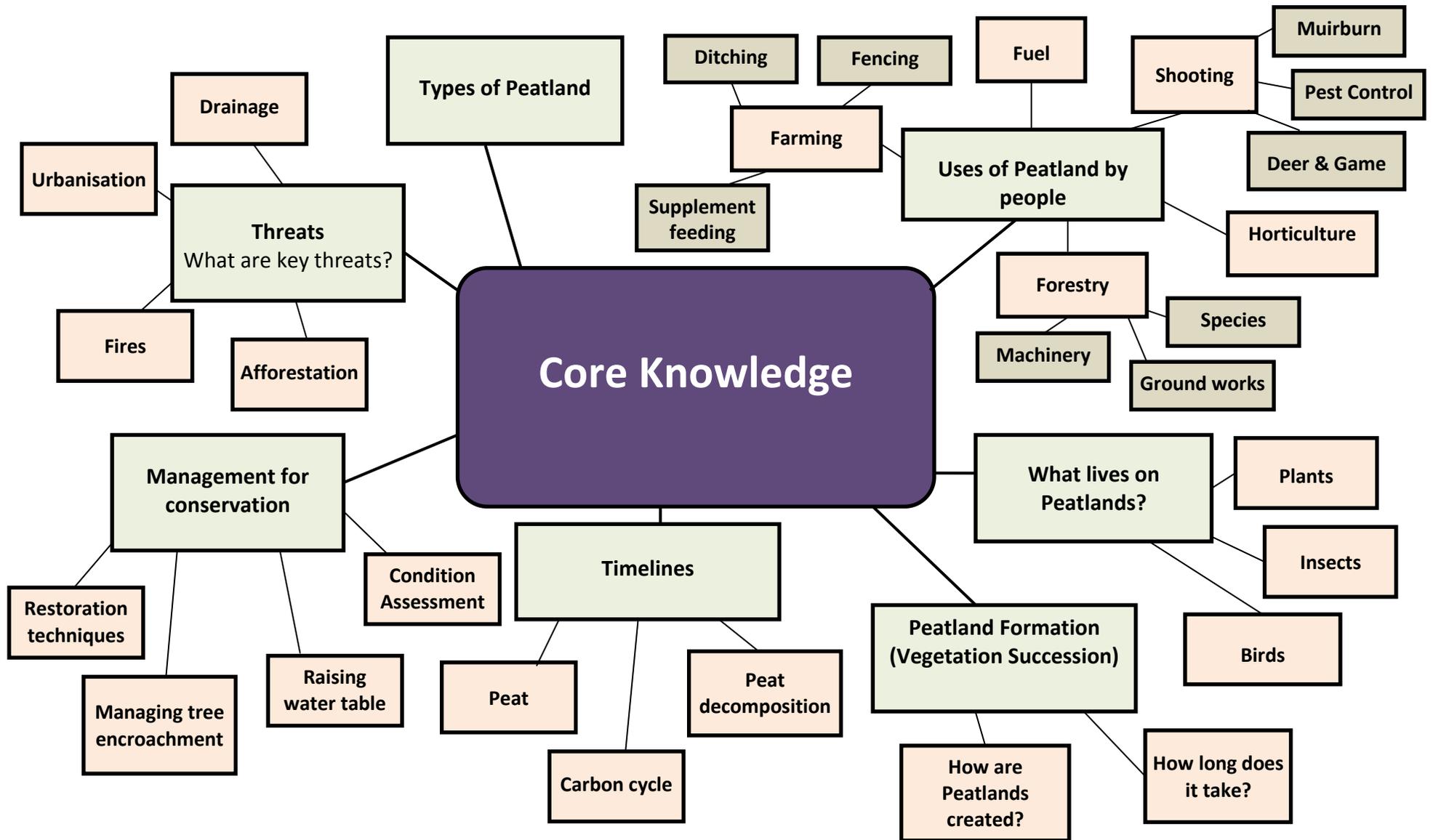
Assessment Condition	Land condition (what can be seen?)
Growing	Active sphagnum growth. Water table at the surface or near surface.
Non-peat forming	Dominant vegetation becomes heathers and grasses. Tussocks of vegetation forming. Scrub encroachment.
Eroding	Large areas of exposed peat, gullies forming. Evidence of peat erosion present.

Detailed analysis of peatland condition can be found in pages 17-23 of the JNCC report 'Towards an assessment of the state of UK peatlands' (see Resource Guide, section 4.3.2).

Table 2 - Café areas links to Core Knowledge

<p><u>Expressive Arts</u></p> <ul style="list-style-type: none"> • Create some of the creatures of peatlands • Create a library of photographs of peatlands • Tell the story of the creation of a peatland 	<p><u>Sciences</u></p> <ul style="list-style-type: none"> • Adaptations of plants and animals e.g. Sphagnum Moss • What and how plants and animals live and interact in peatlands • Vegetation succession • Classification of peatlands • Peatland Condition Assessment
<p><u>Languages</u></p> <ul style="list-style-type: none"> • Read about different types of peatlands from articles and leaflets • Write definitions of different types of peatland • Write an article about peat creation and the importance of peat for a local newspaper 	<p><u>Religious and Moral Education</u></p> <ul style="list-style-type: none"> • Value of peat as a resource – for people and wildlife
<p><u>Social Studies</u></p> <ul style="list-style-type: none"> • Vegetation succession shaping the peatland landscape • Peatland value and changing land uses: forestry, farming, extraction & conservation. • Managing land for people’s benefit • Uses of peat over time – burning & gardening 	<p><u>Technologies</u></p> <ul style="list-style-type: none"> • Use internet to search for key information • Represent a timeline of peat formation as a graph

Figure 1 Core Knowledge Theme



3.3 Peatland Theme: Mapping the Moss

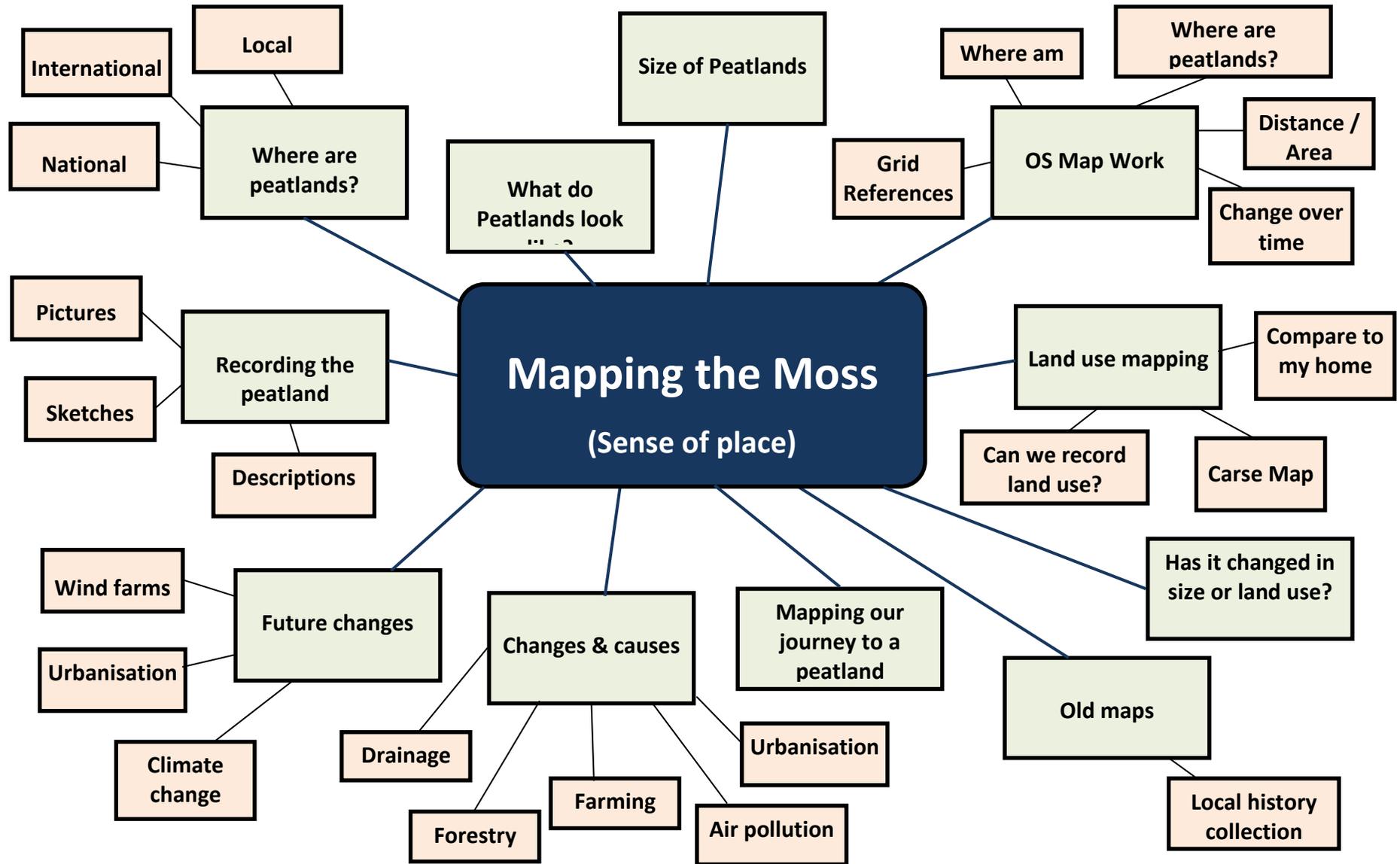
The ‘Mapping the Moss’ theme can be used as an introduction to maps and map work – size, direction and grid references. There is also the opportunity to look at the distribution of peatlands on both the world and national scale. Using Ordnance Survey online maps and historic maps, learners can explore change in landscape in their area and around their local peatland, trying to discover why things have changed over time. Recording the change, perhaps due to people’s impact of draining, forestation and urbanisation, gives great opportunities for graphical representation of change.

Within the resources area of the guide there are websites where learners can search for the landscape and land use types of their area. Armed with this information, learners can undertake their own surveys and site visits to carry out land use mapping exercises, marking different habitats onto maps.

Table 3 - CfE areas links to Mapping the Moss themed activities

<p><u>Expressive Arts</u></p> <ul style="list-style-type: none"> • Create a graphical design of your local peatland • Create a sculpture to represent a local peatland • Take photographs of your peatland 	<p><u>Technologies</u></p> <ul style="list-style-type: none"> • Use internet to search for key information • Use technology to create a digital map for land use • Use various types of software to examine land use change • Use cameras to record land use types
<p><u>Languages</u></p> <ul style="list-style-type: none"> • Investigate Gaelic place names from the map • Investigate local names – (e.g. Blawhorn = Blow Horn) 	<p><u>Sciences</u></p> <ul style="list-style-type: none"> • Habitats of peatlands – Raised and Blanket Bogs • Distribution of plants across peatland – transect
<p><u>Health and Wellbeing</u></p> <ul style="list-style-type: none"> • Actively map your peatland area 	<p><u>Mathematics</u></p> <ul style="list-style-type: none"> • Compare sizes of peatlands - world, national, local context • Create a 2D and 3D map of peatland
<p><u>Social Studies</u></p> <ul style="list-style-type: none"> • Sense of place of peatlands in the landscape • What weather do we have where there are peatlands? • Peatlands worldwide • Size and importance of peatlands in Scotland • Change over time by examining historic maps • Map my journey for a peatland visit 	

Figure 2 Mapping the Moss Theme Map



3.4 Peatland Theme: Special Places

Peatlands are an important part of Scotland's heritage. The 'Special Places' theme seeks to explore why many peat habitats have special protection and what that protection means. Learners may explore who looks after the peatland environment and how they do this by examining management techniques used, such as blocking drains.

A sense of ownership can be engendered by learners. At Blawhorn Moss, learners discovered that the place name Blawhorn came from 'Blow Horn', as the site is on a hill just above the village where locals would sit and watch for the stagecoach arriving in the 18th century. When they saw it coming in, they would blow their horn to make those in the local Inn aware the stage was about to arrive and make ready with fresh horses.

Many of the best examples of peatlands (raised bogs, fens, blanket bogs) are now protected areas. Some have NNR status such as the lowland raised bogs of Blawhorn Moss and Flanders Moss. Others are in National Parks and carry national and international protections through special designations. Designation of these sites is important to protect them from potential threats and links to how they are managed to safeguard and enhance the sites.

This theme should also highlight people's previous, current and future impacts on peatlands and their biodiversity. This can be done by exploring the effects of drainage, afforestation, fires, peat extraction and climate change.

Table 4 - CfE areas links to Special Places themed activities

<p><u>Expressive Arts</u></p> <ul style="list-style-type: none"> • Illustration of my special place • Photograph of my special place • Design a guide for my special place 	<p><u>Health and Wellbeing</u></p> <ul style="list-style-type: none"> • Be safe and comfortable in your special place
<p><u>Religious and Moral Education</u></p> <ul style="list-style-type: none"> • Who should have access to protected land? • What is appropriate? – Scottish Access Code • What is rarity? Quality / quantity 	<p><u>Sciences</u></p> <ul style="list-style-type: none"> • What animals and plants live on/in peatlands? • How do they survive? • Food webs and chains • Peatland Condition Assessment
<p><u>Languages</u></p> <ul style="list-style-type: none"> • Plan your visit to your special place • Write a blog of your visit • Tell the story of someone who lives at your peatland • Investigate local names – (e.g. Blawhorn = Blow Horn) 	<p><u>Technologies</u></p> <ul style="list-style-type: none"> • Use internet to search for key information • Devise a questionnaire to look at my special place, what is special about Peatlands • Create an interactive guide to describe your local Peatland to a visitor
<p><u>Social Studies</u></p> <ul style="list-style-type: none"> • Who looks after peatlands? • Who owns the peat? • How do I visit my local nature reserve? • How are peatlands managed? 	

Figure 3 Special Places Theme Map



3.5 Peatland Theme: Landscape Change

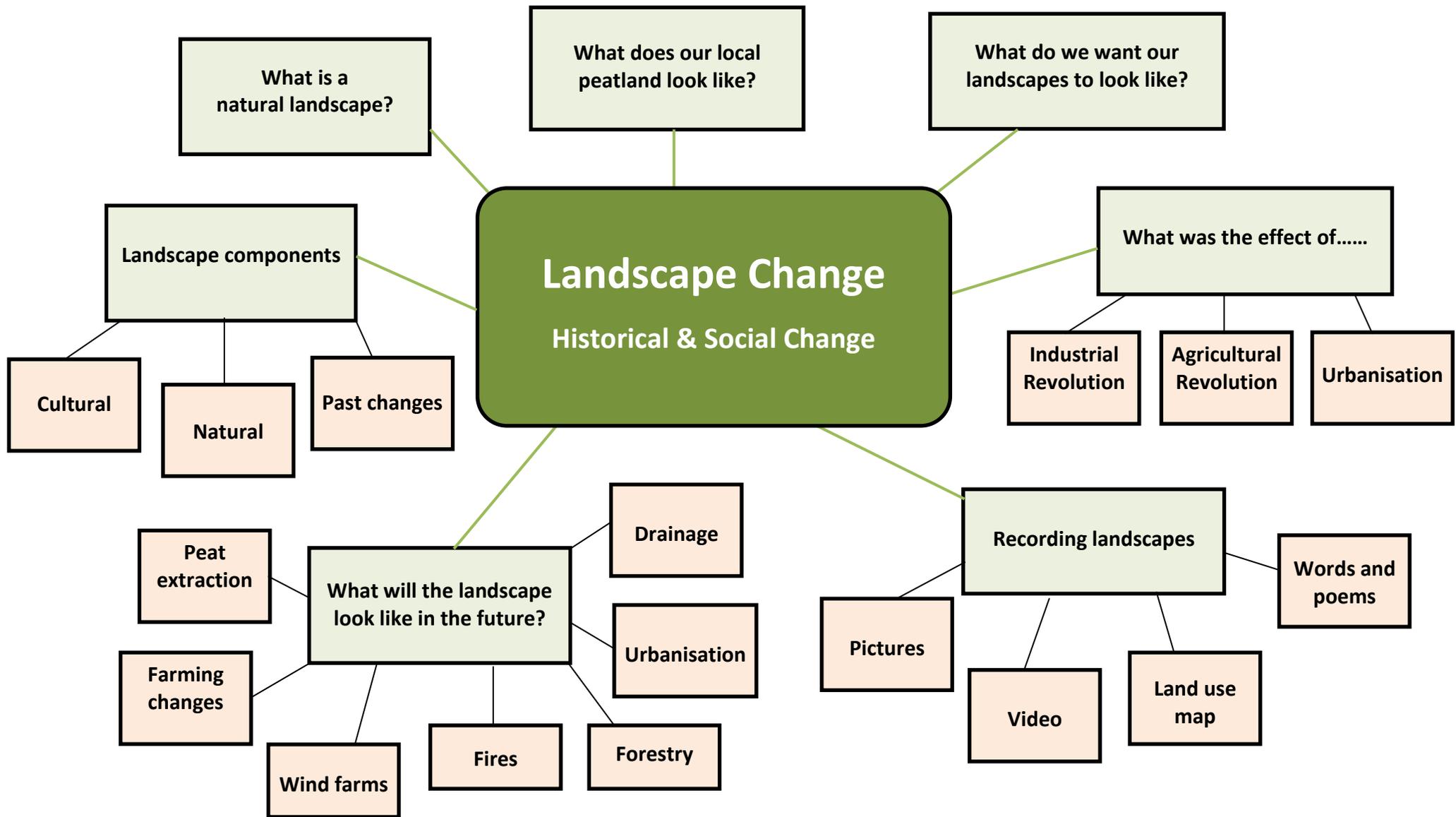
The current landscape is created by a combination of natural processes (vegetation succession) and interactions with people. The cultural and social effects of people on peatlands are described in this 'Landscape Change' theme. The effects of historic events, such as the industrial and agricultural revolutions, and urbanisation will show how landscape has changed over the centuries.

This should lead into thinking about how to record this threatened landscape and what the landscape may look like in the future. Learners should be engaged in thinking about the sort of landscape they would like to have covering this important habitat in Scotland and what role they play in creating the future landscape by deciding how the land will be used.

Table 5 - CfE areas links to Landscape Change themed project activities

<p><u>Expressive Arts</u></p> <ul style="list-style-type: none"> • Design models of different future landscapes • Write about the change in the landscape – historic or future 	<p><u>Religious and Moral Education</u></p> <ul style="list-style-type: none"> • Does the visual landscape matter? <ul style="list-style-type: none"> – Impact of wind turbines • What damages peatlands / nature reserves? <ul style="list-style-type: none"> – Fire setting/Peat cutting
	<p><u>Sciences</u></p> <ul style="list-style-type: none"> • Peat decomposition • Vegetation change over time • Carbon cycle
<p><u>Languages</u></p> <ul style="list-style-type: none"> • Listen to a video about peatlands and make notes 	<p><u>Mathematics</u></p> <ul style="list-style-type: none"> • Describe landscape maps and change graphical and numerically
<p><u>Social Studies</u></p> <ul style="list-style-type: none"> • What was the effect of industrial revolution on peatlands? • What was the effect of increasing populations on peatlands? • Who worked on the peatlands – peat cutting, farming • What do peatlands look like across the world? • How will climate change affect peatlands? 	<p><u>Technologies</u></p> <ul style="list-style-type: none"> • Use internet to search for key information • Create a landscape of the future as a result of different potential land uses • Record current landscapes using video and pictures

Figure 4 Landscape Change Theme Map



3.6 Peatland Theme: Sustainability

Peatlands are very much under threat. But as they cover a large land area in Scotland, the land needs to be used - but what for? The 'Sustainability' theme explores the benefits of peatlands in terms of flood prevention, wildlife, recreation and very importantly, as a carbon sink.

Draining peatlands or burning peat puts carbon into the atmosphere, restoring damaged peatlands and preventing them drying out locks carbon in the ground. The route chosen for the future will have an effect on global climate change and this theme explores the issues around carbon and peat.

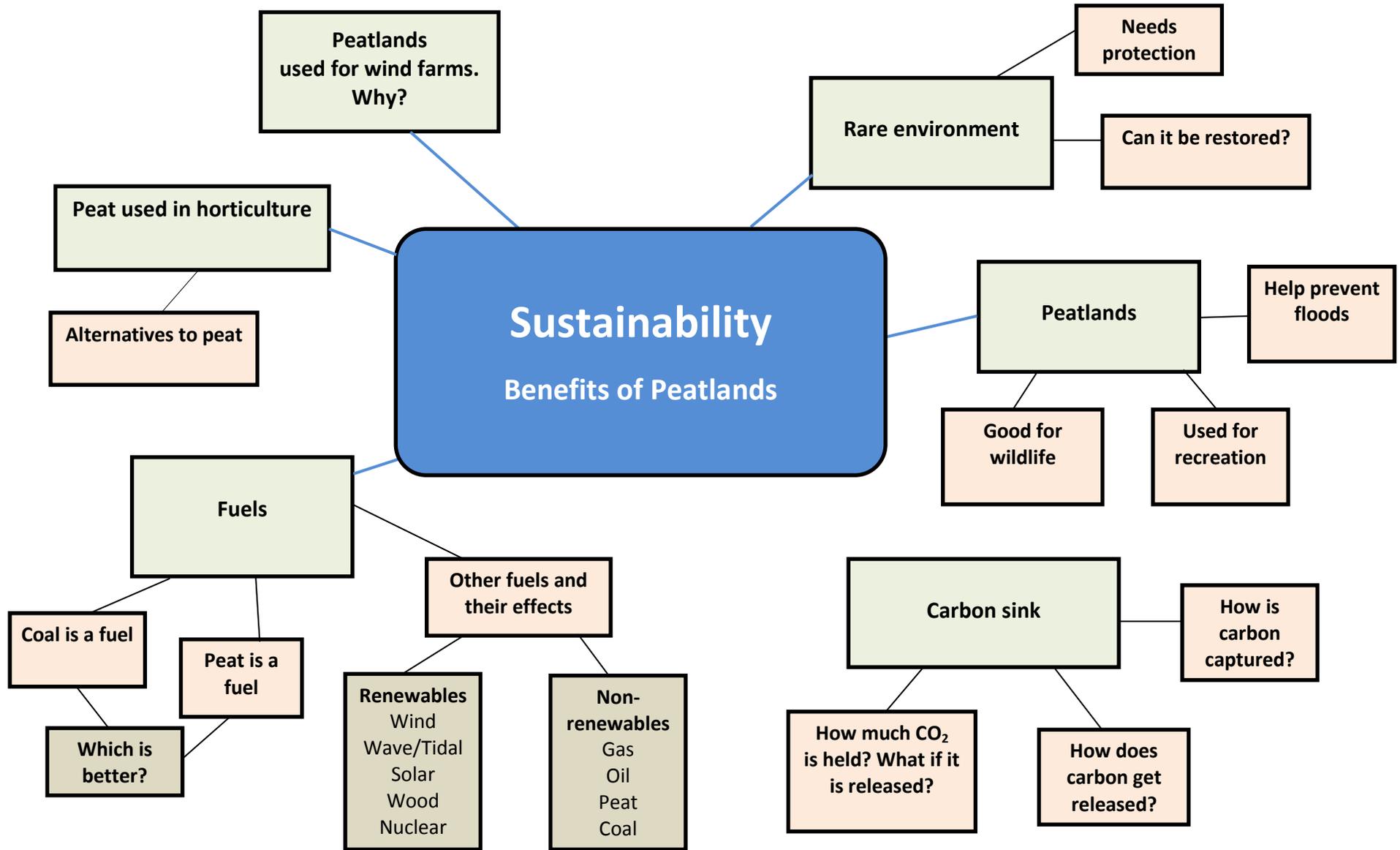
This links directly to sustainable energy (peat can be used as a non-renewable fuel) and the siting of wind farms on peatland, particularly blanket bogs.

Human activities now and in the future will have a huge effect on peatlands and their role in carbon management. The fact that the majority of land based wind farms are sited on peatlands, gives scope to discuss the role of energy and carbon as part of student learning. In the past, peat was cut widely, and dried to be used as a fuel. Due to the growth rate of peat this was an unsustainable activity as it released carbon into the atmosphere in the form of carbon dioxide. Today, wind farms are being built on peatlands and this could help maintain the peatland as a carbon sink, plus the turbines produce sustainable energy.

Table 6 - CfE areas links to Sustainability themed activities

<p><u>Expressive Arts</u></p> <ul style="list-style-type: none"> • Write/perform a drama about the future of your peatland • Perform the role of a peatland worker from the past 	<p><u>Technologies</u></p> <ul style="list-style-type: none"> • Use internet to search for key information • Design a turbine to be sited on a peatland with minimal impact on land and scenery
<p><u>Religious and Moral Education</u></p> <ul style="list-style-type: none"> • Future of peatlands. Who should they benefit? • Is Scotland's carbon for everyone? Who pays to hold the carbon in the land? Debate 	<p><u>Sciences</u></p> <ul style="list-style-type: none"> • Fertilizers and fuel • Is peat cutting sustainable? • Greenhouse effect • Peat as a carbon sink • Wetland and flood events • Soil and water retention • Monitor and climate change
<p><u>Social Studies</u></p> <ul style="list-style-type: none"> • What are the direct and indirect economic benefits of peatland - past, present and future? • What is the value of peat as a Carbon sink? • Do wind farms secure the land safely for the future? • How can we adapt to climate change? 	<p><u>Mathematics</u></p> <ul style="list-style-type: none"> • Compare benefits of energy sources
	<p><u>Languages</u></p> <ul style="list-style-type: none"> • Write down questions you would ask a peatland specialist • Debate the value of different energy sources and their impacts

Figure 5 Sustainability Theme Map



3.7 Peatland Theme: Twinning and Technology

The use of new technology as part of the planned approach to outdoor learning will add value to the outcomes for children and young people. Experiences recorded digitally, for example, can be taken back to the classroom and used to reinforce and further expand on the experience itself.

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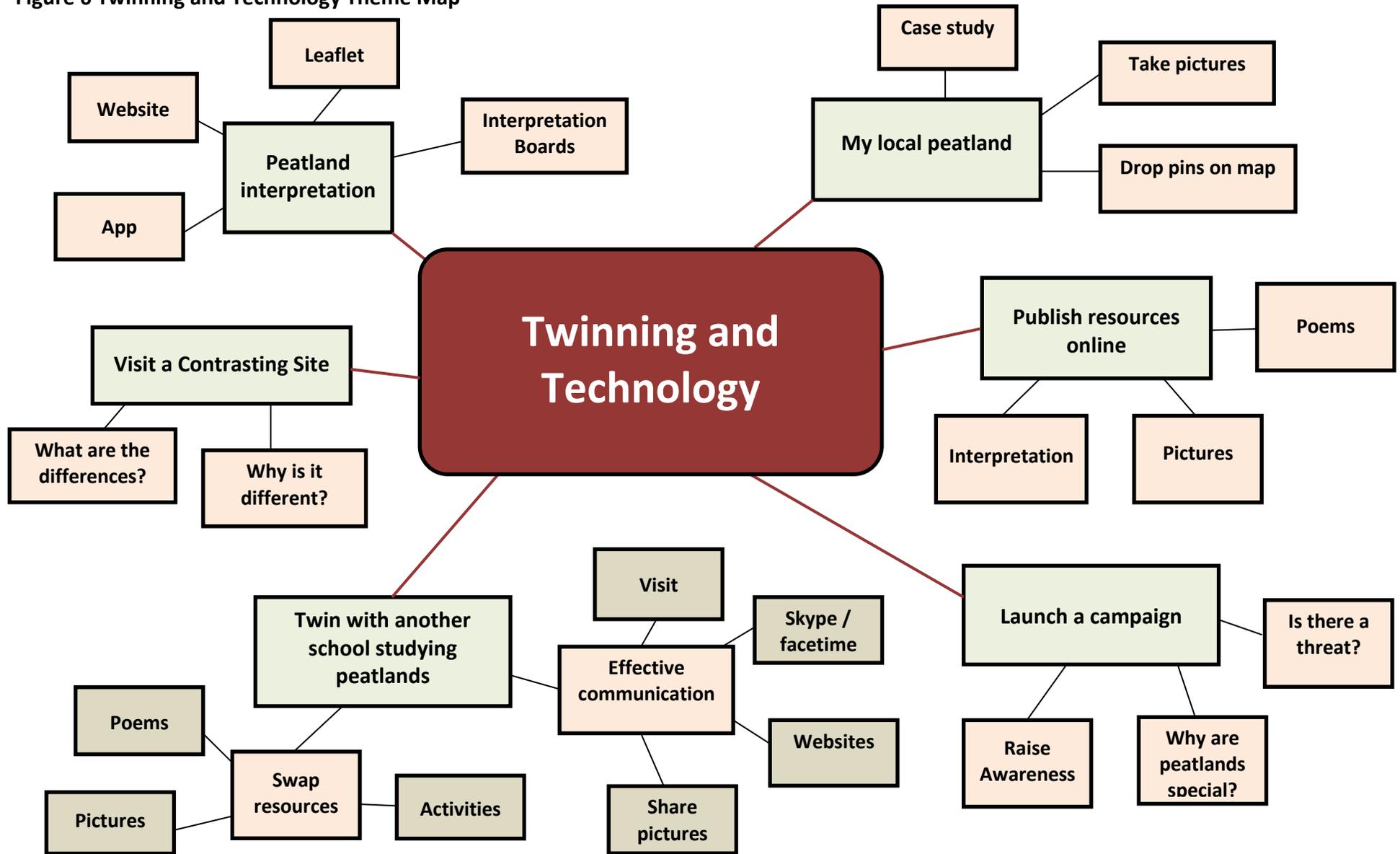
During the project team’s discussion with teachers, it was felt that work done on a local peatland site would be directly transferable to other sites across Scotland. The twinning of two sites by two schools would be a valuable project. For example, a raised bog twinned with a blanket bog would allow learners to discover about the key habitat types of peatlands in an interactive way.

As part of the ‘Twinning and Technology’ theme learners could communicate using webcams and maybe even a visit to each other’s project sites. Technology would be important in this and in helping share information about their two sites. Learners could develop a website for their peatland to help enable the twinning process. Site visits could be recorded by taking photos or videos on iPads that could be incorporated into a nature trail of the peatland devised by the learners.

Table 7 - CfE areas links to the Twinning and Technology theme

<p><u>Expressive Arts</u></p> <ul style="list-style-type: none"> • Share stories or pictures of your peatland • Create an interpretation of your peatland for another group of people 	<p><u>Social Studies</u></p> <ul style="list-style-type: none"> • Are all peat lands the same? How does mine differ from yours? • How can I visit your site? Physically or virtually? • Organise a visit
<p><u>Health and Wellbeing</u></p> <ul style="list-style-type: none"> • Interact with others and share information 	<p><u>Mathematics</u></p> <ul style="list-style-type: none"> • Sizes of files for sharing • Timetabling activities with others
	<p><u>Technologies</u></p> <ul style="list-style-type: none"> • Use Internet to search for key information • Use digital devices to record your local Peatland • Create a visitor website • Communicate your information to a twinned setting using webcam / Skype

Figure 6 Twinning and Technology Theme Map



4. Resource Guide

Curriculum for Excellence through Outdoor Learning has set out a vision for all schools and educational settings to provide frequent and progressive outdoor learning opportunities which are clearly part of the curriculum. It is the responsibility of all involved in education to recognise the place of outdoor learning within the curriculum and plan accordingly to ensure that all children and young people in Scotland receive these opportunities as part of their learning journey.

Curriculum for Excellence through Outdoor Learning

4.1 Cultural Heritage

4.1.1 Social

Education

Schools Out, Fieldwork made easy - Peatlands. The Peatland pack provides topic-based activity sheets for fieldwork on peatlands. The pack also provides guidelines to assist teachers (or other leaders) in planning school excursions for fieldwork activities in the countryside

<http://www.snh.gov.uk/publications-data-and-research/publications/search-the-catalogue/publication-detail/?id=137>

Wild, Wet and Wonderful: A teaching pack for peat bog projects. This downloadable PDF is full of factual information and activities designed to introduce students and teachers to the wonders of peat bogs. The pack includes good fact sheets - including some historical case studies - and well-presented food web diagrams to help teachers and pupils understand the importance of this little known habitat - <http://www.snh.gov.uk/publications-data-and-research/publications/search-the-catalogue/publication-detail/?id=138>

Landscapes 4-15: Part of the Scottish Nature Heritage range of resources on developing the idea of landscapes with pupils. Lots of resources for primary pupils for site visits - <http://www.snh.gov.uk/about-scotlands-nature/resources-for-teaching/>

Irish Peatland Conservation Council (IPCC) has activity ideas based on peat, including how to make a 'bog in a bottle' at – <http://www.ipcc.ie/discover-and-learn/resources/>

Cairngorm National Park Authority has two education guides to Abernethy and Muir of Dinnet which contain information and activities based on peatlands that can be adapted to your local peatland – <http://cairngorms.co.uk/caring-future/education-learning/projects-for-schools/learning-resources/>

Bug life provides teaching packs for a range of activities surrounding bog restoration
<https://www.buglife.org.uk/slamannan-bog-restoration>

Scottish Government provide an education pack aimed at raising children's awareness of wildlife crime issues – <http://news.scotland.gov.uk/News/Rearing-young-detectives-8cc.aspx>

The *Breathing Spaces* resource is based on the latest research on peatlands, giving pupils a unique insight into the hidden beauty and value of these environments to UK society -
http://www.nationalparks.gov.uk/learningabout/teachersarea/teaching-resources/act_more-than-just-a-bog/Peatlands.pdf

Safety Outdoors

Outdoor Learning is a new web resource developed by Learning Teaching Scotland (LTS) in partnership with SNH, Forestry Commission Scotland and the Scottish Advisory Panel for Outdoor Education. -

<http://www.educationscotland.gov.uk/resources/o/outdoorlearningpracticalguidanceideasandsupportforteachersandpractitionersinscotland.asp?strReferringChannel=learningteachingandassessment&strReferringPageID=tcm:4-581689-64&class=l2+d135079>

The Scottish Executive has produced 'Health and Safety on Educational Excursions' - A Good Practice Guide - <http://www.scotland.gov.uk/Publications/2004/12/20444/48943>

Advice on going to the toilet outdoors can be found at toileting outdoors –
<http://creativestartlearning.co.uk/early-years-outdoors/where-to-go-when-you-need-to-go/>

Mapping Special Places

Scottish Natural Heritage mapping site: Scotland's Environment Website brings environmental information, held by different organisations, together in one place. It contains a mapping tool to search for special places and species sightings, data on protected areas, National Nature Reserves, casework, grants, licenses and more – <http://www.snh.gov.uk/publications-data-and-research/snh-information-service/map/>

Ordnance Survey maps of Scotland: These maps should allow learners to map and locate peatland sites. The Ordnance Survey site also contains lots of ideas for how to teach map work to learners and has ideas for local geographical surveys –

- <http://www.ordnancesurvey.co.uk/oswebsite/opendata/viewer/>.
- <http://www.ordnancesurvey.co.uk/oswebsite/education-and-research/teaching-resources/geography-through-the-window-primary.html>

Geographical Association (GA) has ideas about using Google maps to use your pupils' photographs to map their local area -

<http://www.geography.org.uk/cpdevents/onlinecpd/younggeographersgolocal/gettingtoknowyourlocalarea/>.

The Royal Geographical Society provides information on using maps to look at change in your local area –

<http://www.rgs.org/OurWork/Schools/Teaching+resources/Key+Stage+3+resources/Our+place+in+history/Mapping+change.htm>

BBC Landscapes of Scotland aims to look at landscape and develop Map Skills. It is aimed at P4/5 or 7-9 year olds. - <http://www.bbc.co.uk/scotland/education/sym/landscapes/index.shtml>

Map Zone has ideas and plans for teaching about map -

<http://mapzone.ordnancesurvey.co.uk/mapzone/competitions.html>

For land use mapping, an exciting project in the Carse of Stirling, around Flanders Moss NNR, can be used as a template for mapping your own peatland. This scheme has been developed using an ecosystem approach to land use:

http://www.snh.org.uk/pdfs/publications/commissioned_reports/532.pdf

4.1.2 Economic

Land use

Wetlands: <http://youtu.be/GQ1JZ1zKdYw> - This video 12 minute looks at the benefits that wetlands provide to society and highlights historical and future uses of wetlands that will also benefit the biodiversity of wetlands.

Historical Ordnance Survey maps are available online from *Vision of Britain*. These can be used to compare land use change over time - <http://www.visionofbritain.org.uk/maps/index.jsp>.

Historic Land-use Assessment Map is an analysis of the present landscape, recording the visible traces of past land-use across Scotland, and presenting it as a digital map. Use it to see what used to be in your area – <http://hla.rcahms.gov.uk>

Old maps allows you to explore historic maps and view past land use in your chosen area – <http://www.old-maps.co.uk/index.html>

National Library of Scotland's digitised map collection

<http://maps.nls.uk/>

Scotlandsplaces

<http://www.scotlandsplaces.gov.uk/search/partner/Flanders>

Unsustainable use of the land and alternatives

A detailed article about peat extraction, with case studies, is available from – <http://www.ipcc.ie/a-to-z-peatlands/peatland-action-plan/over-exploitation-of-peatlands-for-peat/>

There are a range of resources about *peat alternatives for gardens*. These can all be used by learners:

- Scottish Natural Heritage - Gardening without Peat - <http://www.snh.gov.uk/publications-data-and-research/publications/search-the-catalogue/publication-detail/?id=1009>
- Natural England's resource guide – <http://webarchive.nationalarchives.gov.uk/20160113000001/http://publications.naturalengland.org.uk/publication/35032>
- Garden Organic has a guide to making a compost heap at <http://www.gardenorganic.org.uk/how-do-i-make-my-compost>

4.2 Natural Heritage

4.2.1 Habitat

Peatbogs

Lowland Raised Bogs, information about the habitat and management of the habitat - <http://www.snh.gov.uk/about-scotlands-nature/habitats-and-ecosystems/lochs-rivers-and-wetlands/lowland-wetlands/>

Blanket Bog, information about the habitat and management of the habitat - <http://www.snh.gov.uk/about-scotlands-nature/habitats-and-ecosystems/mountains-heaths-and-bogs/peat-bogs/>

Wikipedia has a number of pages on boglands that give good background information for learners. This is the link to the Blanket Bog page, however others are easy to find following this link - http://en.wikipedia.org/wiki/Blanket_bog

Joint Nature Conservation Committee (JNCC) has produced a detailed report 'Towards an assessment of the state of UK Peatlands' - <http://jncc.defra.gov.uk/page-5861>. This work covers the state of UK peatlands and their threats. It also brings together lots of sources of academic information on peatlands.

International Peat Society - This website contains lots of information on peatlands, classification, climate change, use of peat and tropical peatlands - <http://www.peatsociety.org/peatlands-and-peat/what-peat>

Natural England produce this leaflet on the importance of Peat Bog Conservation for lowland raised bogs <http://publications.naturalengland.org.uk/publication/80014?category=24011>

The *Royal Society for the Protection of Birds* give their view of the importance of peatlands – <http://www.rspb.org.uk/ourwork/policy/agriculture/farmingsustainability/peatlands/>

Forest Commission provide a succinct overview of peatlands, their importance, distribution and associated flora and fauna – <http://www.forestry.gov.uk/forestry/lowlandbog>

<http://www.snh.gov.uk/docs/A1509883.pdf>

Buglife have habitat information about [Blanket bogs](#) and [Raised bogs](#). The pages contain information about the habitats, threats to these habitats and information about their hydrology and management.

Peatlands in Scotland

Information about *National Nature Reserves* (NNRs) in Scotland, contains links to pages about individual NNRs -

<http://www.snh.gov.uk/protecting-scotlands-nature/protected-areas/national-designations/nnr/>

NNR Information - Key information about Scotland's National Nature Reserves - <http://www.nnr-scotland.org.uk/>

Blawhorn Moss, information about this nature reserve – <http://www.nnr-scotland.org.uk/blawhorn-moss/>

The Story of Blawhorn Moss *National Nature Reserve* - <http://www.snh.gov.uk/publications-data-and-research/publications/search-the-catalogue/publication-detail/?id=1611>

The Reserve Plan for Blawhorn Moss NNR - <http://www.snh.gov.uk/publications-data-and-research/publications/search-the-catalogue/publication-detail/?id=1610>

Visit Blawhorn Moss NNR leaflet - <http://www.snh.gov.uk/publications-data-and-research/publications/search-the-catalogue/publication-detail/?id=339>

Flanders Moss - <http://www.nnr-scotland.org.uk/flanders-moss/>

Peatlands Worldwide

The story of *Irish Peatlands* webpage covers the formation of and importance of Irish peatbogs. It also describes the ways peat has been used in the past and the challenges peatbogs face - <http://www.wesleyjohnston.com/users/ireland/geography/bogs.html>

Blanket Bog Restoration in Ireland gives general well written introduction to blanket bogs and their importance. Other parts of the site give case studies of peatland restoration schemes - http://ec.europa.eu/environment/life/project/Projects/index.cfm?fuseaction=home.showFile&rep=file&fil=LIFE02_NAT_IRL_008490_LAYMAN.pdf

Peatlands in New Zealand - <http://www.waikatoregion.govt.nz/Environment/Natural-resources/Land-and-soil/Managing-Land-and-Soil/Managing-peat/>

Tropical Peatlands - <http://blogs.helsinki.fi/jvjauhia/>

Tropical peat swamps

<http://www.wetlands.org/Whatarewetlands/Peatlands/Tropicalpeatswampforests/tabid/2739/Default.aspx>

4.2.2 Abiotic

Soil and Geology

The James Hutton Institute has information under the guise of the 'Dirt Doctor' on peat as a soil. Excellent videos of peat soils and downloads about peat soil profiles –

<http://www.hutton.ac.uk/learning/dirt-doctor>

The Macaulay Land Use Research. The site gives land cover types for Scotland -

<http://www.macaulay.ac.uk/explorescotland/soils1.html>

The Institute also runs the Soil Indicators for Scottish Soils (SIFSS) is an interactive web application for to find out what soil are in your backyard -

<http://sifss.hutton.ac.uk/>

Note peat soil (blanket and basin peat) are referred to as unit 3, 4, 603, 604, 605 and 606.

NERC soil portal - The [NERC Soil Portal](#) provides a gateway to discover, view and download large-scale soils property datasets from across NERC research centres. The site covers in depth information about soils in Britain including soil maps and information all about soil carbon concentration in topsoil.

Countryside Survey is an 'audit' of the natural resources of the UK's countryside. The Survey has been carried out at intervals since 1978. The latest in this UK-wide series of Surveys took place in 2007 and the results and analyses are now available from - <http://www.countrysidesurvey.org.uk/land-cover-map-2007>.

Soils Scotland presents key facts on Scotland's soils, their functions and the pressures they face, the website also includes interactive maps and datasets which you can download – www.soils-scotland.gov.uk

British Society of Soil Science provides education resources that can be used to explore soil with children – <http://soils.org.uk/education>

Scotland's Environment explains the importance of peatland soils – http://www.environment.scotland.gov.uk/our_environment/land/soils.aspx

From the *UK National Parks* website these is information and a case study from the peak district about damage to peatlands and peatland restoration – <http://www.nationalparks.gov.uk/learningabout/ourchallenges/climatechange/peatlands>

CIS handles a wide range of environmental data including; landscape features, vegetation habitats and topography for each one kilometre square of Great Britain - <https://eip.ceh.ac.uk/>

Bog Bodies

The internet has many resources about Pete Marsh and Lindow Man; a quick search will show many resources, but here is a useful one: http://en.wikipedia.org/wiki/Lindow_Man

BBC Alba has a 'mission' to discover more about Bog Bodies -

http://www.bbc.co.uk/alba/foghlam/axon/parents_teachers/mission2.shtml

4.2.3 Biotic

Plant and Animal Identification can be supported by purchasing folding keys from Field Studies Council – <http://www.field-studies-council.org/publications/pubs/moorland-plants.aspx>

Irish Peat Conservation Council provide information on sphagnum moss and its role as a 'peat builder' – <http://www.ipcc.ie/a-to-z-peatlands/sphagnum-moss-the-bog-builder/> and <http://www.ipcc.ie/a-to-z-peatlands/carnivorous-plants-killers-in-the-bog/> provides information on insectivore plants found on peatbogs.

Notice Nature gives information on life cycles of dragonflies and damselflies -

<http://www.noticenature.ie/files/enfo/factsheet/en/WL37%20Dragonfly%20eng.pdf>

BBC Nature has a collection of short videos including some from David Attenborough's 'life' series. Some videos cover the insectivores' species found in raised bogs -

<http://www.bbc.co.uk/nature/life/Drosera>

4.3 Conservation

4.3.1 Sustainable Management

Scottish Natural Heritage

Peatbog - This video was originally produced to provide attendees at a SNH Sharing Good Practice event on Restoration and Decommissioning of Windfarms with a 'virtual' site visit to highlight good practice techniques and management options for peat bog restoration. The 13 minutes video covers such topics as ditch blocking and damming techniques, peat depth surveys, livestock management on restoration sites, woodland management, particularly regeneration, water tables, sphagnum mosses and other bog flora and fauna - <http://www.snh.gov.uk/planning-and-development/renewable-energy/onshore-wind/peat-restoration-video/>

The *Green Stimulus Project* is a Scottish Government initiative to reduce carbon released into the atmosphere by helping to restore degraded peatlands – <http://www.snh.gov.uk/climate-change/what-snh-is-doing/green-stimulus-peatland-restoration/>

Landscape management with Fire describes why and how you might use fire as a management tool - <http://www.snh.gov.uk/land-and-sea/managing-the-land/upland-and-moorland/fire-friend-or-foe/>

Fen Handbook - The Handbook highlights practical techniques and provides the background science that underpins the different fen management techniques. <http://www.snh.gov.uk/about-scotlands-nature/habitats-and-ecosystems/lochs-rivers-and-wetlands/fen/>

'Sustaining nature's services - Adopting an ecosystem approach' is a general guide by SNH to reclamation and importance of natural areas <http://www.snh.gov.uk/docs/C334569.pdf>

A detailed publication, this downloadable handbook highlights practical techniques but also provides the background science that underpins different fen management techniques.

<http://www.snh.gov.uk/about-scotlands-nature/habitats-and-ecosystems/lochs-rivers-and-wetlands/fen/>

Other conservation organizations

IUNC peatland gateway showcases peatland restoration projects from across the UK and welcomes new contributions - <http://www.iucn-uk-peatlandprogramme.org/peatland-gateway/uk>

Joint Nature Conservation Committee (JNCC) manages the UK Biodiversity Action Plans website. This lists *Priority Habitats* such as Blanket Bogs <http://jncc.defra.gov.uk/page-5706> and contains in depth articles about habitat management for bogs such as the Caithness Flow Country <http://jncc.defra.gov.uk/page-4281>

Plantlife is an organisation that speaks up for our plants and fungi. As a result they have a vested interest in the protection of peatlands. This link directs to the Plantlife campaign on saving our peatlands –

http://www.plantlife.org.uk/our_work/policy/policy/peat

High and Dry Flooding Resource - a flooding-themed teaching resource created by the Scottish Environment Protection Agency (SEPA). It aims to raise awareness about how flooding - and the climate change that might cause it - can affect young people, their families and their homes. The resource includes a teaching pack with a range of activities and handouts on topics including the water cycle and creating a 'flood kit'.

http://www.educationscotland.gov.uk/resources/s/genericresource_tcm4730428.asp?strReferringChannel=learningteachingandassessment&strReferringPageID=tcm:4-628672-64&class=I5+d139787

4.3.2 Climate Change

British Geological Survey – gives downloadable data on British geology for any area, but also includes a wealth of information about Carbon sequestration and management. (Website is a little hard to navigate). <http://www.bgs.ac.uk/discoveringGeology/climateChange/home.html>

In general the following guides are detailed and will require some work to use with pupils.

The Scottish Parliament – Peatlands and Climate Change. Healthy peatlands act as a sink for greenhouse gases, while degraded peatlands can act as a large source of carbon dioxide. Scottish peatlands are important for climate change adaptation; water quality and flow; and are culturally valuable. This briefing describes the ecosystems with particular emphasis on their importance for climate change mitigation - <http://www.scottish.parliament.uk/parliamentarybusiness/49851.aspx>

RSPB - A critical synthesis to inform policy development in peat bog conservation and restoration in the context of climate change. http://www.rspb.org.uk/Images/Peatbogs_and_carbon_tcm9-255200.pdf

This *Natural England* report describes the extent and current condition of England's peatlands and estimates the amount of carbon they store, as well as the amount of carbon being lost. It then assesses the potential carbon savings that widespread restoration could deliver and evaluates the economic costs and benefits.

<http://publications.naturalengland.org.uk/publication/30021?category=24011>

KE - Knowledge Exchange network from UK research council and research providers - some of it is relevant to peatlands and carbon management. -

<http://planetearth.nerc.ac.uk/features/story.aspx?id=1163>

Scotland's Environment explains the international context of the importance of the carbon in Scotland's peat bogs -http://www.environment.scotland.gov.uk/our_environment/land/soils.aspx

Interesting articles on carbon balance and peatlands drying out can be found at –

<http://planetearth.nerc.ac.uk/features/story.aspx?id=446> and

<http://planetearth.nerc.ac.uk/news/story.aspx?id=1112>

5. Outdoor Learning: Health, Safety, Welfare and Other Considerations

Managing the health and safety of learners and staff in outdoor learning settings is vitally important but with careful planning and conduct, outdoor experiences can be both safe and stimulating. Most outdoor learning activities carry no higher risk than activities and situations faced by learners on a day-to-day basis.

Teachers and others taking children and young people outdoors are uniquely placed to manage their own visits using a risk assessment approach, and where appropriate they should use the published guidance and the advice of senior staff and specialists to reduce risk to an acceptable level.

Resources contained in the Health and Safety Section of the Resoures Guide (Section 4.13) will guide and support the less experienced teacher in developing a site visit plan and risk assessment for their outdoor activity. The Scottish Executive has produced 'Health and Safety on Educational Excursions Good Practice Guide' and 'Outdoor Learning' is a web resource developed by Learning Teaching Scotland (LTS) in partnership with SNH, Forestry Commission Scotland and the Scottish Advisory Panel for Outdoor Education.

<http://www.educationscotland.gov.uk/learningteachingandassessment/approaches/outdoorlearning/>

National Nature Reserves are the best sites for site visits for educational work. They are open access and have facilities and interpretation. This is why this resource has been developed around Blawhorn Moss NNR. Where sites are in private ownership, it is important to contact the private landowner prior to a visit.

Whenever visiting a site, try and get in touch with the landowner to find out detailed access information for the area, such as best parking places or places to avoid, for example; where there are nesting birds.

Toilet facilities may only be available at a small number of sites and may have to be found locally. Using the example of Blawhorn Moss, there are public toilets in Blackridge village library, about 1 mile from the reserve, additionally there are toilets at the railway station. Most prudent group leaders will make a visit to these when they arrive in the area and when they leave to minimize the need to go to the toilet on site. If students do need to go on-site then it is important to follow the Scottish Access Code guidelines for going to the toilet outside:

- If anyone needs a pee, then this must be done at least 30m from open water, rivers or streams.
- Although pee is less harmful than poo, its smell is unpleasant, so avoid peeing in caves, at the foot of crags or behind any buildings. Also encourage children (especially boys) to aim at the ground, not at a log or 'pee tree'. If anyone needs a poo, then go as far away as possible from buildings, from open water, rivers and streams, and from any farm animals.
- Bury poo and toilet paper in a shallow hole and replace the turf. Carry a plastic trowel with you for this purpose.

- Alternatively, collect the human poo and used toilet paper, in a double wrapped, sealed, plastic bags and dispose of it off site, following your local authority guidelines for biological agents.
- Wash your hands, following good hand hygiene practices. Liquid antibacterial hand rub is useful for these purposes.

Child protection procedures always apply outdoors. If you have to change nappies, children's clothes or assist with toileting, follow your school or local authority procedures. For nappy changing, pop-up shelters or pods can be handy.

Remember to have procedures in place for enabling adults to go to the toilet. For example, some settings prefer adults to go in pairs, so that one can lookout for the other and ensure children do not accidentally come across an adult going to the toilet in the woods.

6. Dissemination of project resources

6.1 On-line resources

Many teachers use online resources to help plan and prepare themes and learner resources. The key project materials will be made available through a number of online sources, including the following:

Glow resources A collection of online digital resources and activities available to authenticated users of Glow. Site managed through Education Scotland.
<http://www.educationscotland.gov.uk/usingglowandict/resources/index.asp>

TES Online TES Teaching Resources is a site that teachers use to share and download free lesson plans, classroom resources and curriculum worksheets.
<http://www.tes.co.uk/teaching-resources/>

Primary Resources Free lesson plans, activity ideas and resources for primary teachers.
<http://www.primaryresources.co.uk/>

These sites will make this peatland resource accessible to teachers in Scotland and throughout the UK.

6.2 Sharing project resources between schools

It is hoped that once teachers have used the resources, whether dipping into it to support other learning or running a theme with their class, they will feedback to other schools in their area. Primary Schools belong to clusters who can share this resource. In particular, Theme 5 which focuses on the use of 'Twinning and Technology', is designed to allow learners to share information about their own peatland site with others.

6.3 Local Resources

The peatland guide also encourages the use of other resources held locally to allow learners to look at change in their local landscape and landuse over time. This information could be available through their local library and its local studies section. For Blawhorn Moss, Blackridge Community Museum was a resource that was used for research for parts of this project.

7. Feedback Form

To assist in ensuring that the guide remains relevant and useful to teachers in the future, a feedback form had been enclosed. SNH values all feedback from teachers who have used any part of the guide.

If you would be willing to provide feedback on the guide we would appreciate hearing from you. Please [complete and return this form](#) to stirlingnrs@snh.gov.uk

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9. Document properties

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Appendix 1 - Peatland Curriculum Map
 Map available as a separate file – [pdf link](http://www.snh.gov.uk/docs/A980256.pdf)
 (<http://www.snh.gov.uk/docs/A980256.pdf>)

