IUCN National Committee United Kingdom

Peatland Programme

TLC + associates

Scoping Study:

Proposed Training Opportunities in Peatland Management

30th April 2019

Executive Summary

This scoping study commissioned by the IUCN Peatland Project UK aims to explore how peatland education is currently offered within the senior phase of High School in the Highlands of Scotland. Focusing on informants from a small, purposive sample the study centres on Ullapool High School. The study also examines current literature, existing qualifications and teaching resources within this context. Interest and demand within schools, colleges and industry is examined, with a view to developing a pilot framework for vocational education within the senior phase of High School at a National level.

The educational benefit of peatlands are currently under-explored. Though some examples of implementation and good practice exist there is potential for a more embedded approach which will enhance existing academic and vocational practice. Moreover, there appears to be a significant skills gap in terms for the greening of vocational training. This gap is evident within literature and reported findings from industry and conservation bodies which indicates that the greening of skills can support the green economy is growing exponentially within the UK and abroad.

Using peatland as a lens to enhance vocational educational opportunities could present a means to add to existing vocational awards and supports social, environmental and educational policy. In addition, there is scope to develop sustainable learning outcomes to support peatland education within, or alongside existing awards which could be implemented as part of a collaborative action research pilot. Peatlands are recognised as a vital landscape to support positive management techniques to combat climate change which aligns with current youth initiatives which campaign for sustainability.

Demand within schools and colleges indicates there is support to promote the peatland as a Learnscape which can achieve outcomes for academic, cultural and vocational learning. However, it is noted that barriers to delivery exist due to funding restrictions within rural areas which can arise from falling school rolls. Peatland is not supported in the core curriculum and there is a place for critical, partnership working between schools, further education colleges, communities, employers and conservation bodies to come together to enhance vocational learning through collaboration and the use of open education resources.

A vocational pilot project is recommended to work with partners within schools, colleges, third sector and industry to pilot and deliver vocational education in the context of peatland and develop further learning outcomes to formalise a peatland learning module in the future that can be used nationally.

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1 Introduction

This scoping study has been commissioned by the International Union for the Conservation of Nature UK Peatland Programme (IUCN UK PP) in partnership with the John Muir Trust and funded by the John Ellerman Foundation, to investigate opportunities to provide peatland learning opportunities to school and further education (FE) school/college partnership students within local communities across a National scale.

TLC partnership have a background in rural education training and delivery of education projects. As such our research is informed by practice as educators and researchers. This identity memo (Robson, 2011:49) informs our ontological standpoint and approach to the scoping as an interpretative study to examine current practice and highlight opportunities to embed peatland learning within existing curricular frameworks. The work has been identified as:

Scoping

- Identification of existing national occupational standards (NOS), national courses (NC) within the Scottish Credit and Qualifications Framework (SCQF) and modern apprenticeships (MA) that lend themselves to accommodating peatland learning.
- Identification of existing qualifications (including the above) that have potential to benefit from/accommodate a peatland specific land use and management unit.
- Identification of existing teaching materials and opportunities available, or in development, from IUCN UK PP partners and others as available.
- Explore demand/interest in schools/colleges and potential school/college partners via a purposive sample from Ullapool High School contacts: Head Teacher, Highland Council Strategic curriculum staff and others with an in depth interview.

Pilot Proposal

- Detail theoretical pilot units or teaching elements that could be delivered in Ullapool High School beyond June 2019 including the mechanisms for delivery and possible future funding opportunities.

2 Background to the Study

2.1. IUCN UK Peatland Programme

The IUCN UK Peatland Programme exists to promote peatland restoration in the UK and advocates the multiple benefits for peatlands through partnerships, strong science, sound policy and effective practice.

The long term vision of the programme is that peatlands in the UK will function to their full potential and that there is no further loss of peatland ecosystems, which will help to mitigate climate change.

The work of the Peatland Programme is overseen by a coalition of partner bodies including:

Defra, John Muir Trust, Moors for the Future Partnership, National Trust for Scotland, Natural England, Natural Resources Wales, North Pennines AONB Partnership, RSPB, Scottish Natural Heritage, Scottish Wildlife Trust, University of East London, University of Newcastle and Yorkshire Wildlife Trust.

In Scotland the programme is hosted by the Scottish Wildlife Trust and is primarily funded by The Peter De Haan Charitable Trust.

2.2 Rationale for Training Need

There is a need to disseminate peatland knowledge in a variety of contexts as peatland is a global and ancient landscape that is under threat. Peatland sites that are effectively managed can capture carbon, improve water quality and protect biodiversity. Sites under threat can be damaged, either because they are not recognised as peatland sites, or due to human actions (Lindsay, 2019).

Global political targets focus on climate change, and this is now cascading into everyday practice. For young people the issue of climate change is increasingly at the forefront of their everyday lives and recent action brought about by "School Strike" has heightened global awareness of issues pertaining to carbon (Rutter, 2019).

Peatlands are ancient habitats that store a record of natural and human development back to pre-Neolithic times. Humans rarely go, consciously, to a peatland landscape.

Peatland has the potential to alter human perceptions of what can be considered a "bleak and empty" landscape to an environmental experience rich in visual, historic and scientific information (Lindsay, 2019).

A broad rationale for training need has been identified by the IUCN UK PP as:

- Environmental policy drivers
- Maintaining employment opportunities for young people in rural areas through appropriate training provision
- Up-skilling through vocational training for contractors and consultants, supporting and encouraging environmental science and ecology students into academia
- Developing a strong understanding of functional peatland ecology
- Filling existing skills gaps where they exist and supporting peatland partnerships for practical restoration projects

This section examines how the rationale can link to supporting learners within the senior phase of High School, in particular for those students who wish to find opportunities within their local communities for work and vocational training in rural industries.

2.2.1 Environmental Policy Drivers

With a shift in agri-environment schemes towards payment for the delivery of public goods and services. There has been a global move towards payment for ecosystem services (PES) which aims to align effective agricultural production with environmental protection (Canova et al., 2019:165).

Table 1: Global, national and local statutory policy and codes of good practice relating to Peatland

Policy
United Nations Framework Convention on Climate Change
United Nations Strategic plan for Biodiversity 2011-2020, including Aichi Biodiversity Targets
UN Environmental Programme Global Peatlands Initiative
IUCN UK Peatland Strategy
Scottish Government. The Climate Change (Scotland) Act 2009
Scottish Government. Climate Change Plan 2018-2032
Scottish Government. Scotland's Land Use Strategy 2016 - 2021
Scottish Government. Scotland's Economic Strategy
SNH. Scotland's National Peatland Plan

2.2.2 Educational Policy Drivers

Globally peatland learning themes align with the UNESCO Sustainable Development Goals. This scope also notes current Scottish educational policy at national and local levels in terms of learning for sustainability in academic and vocational settings.

Policy for excellence in education and empowerment for curriculum leadership through delivery of partnerships within local communities is driven by statutory policy and best practice guidance at a local level.

Table 2: Educational Policy Drivers for sustainability and outdoor learning

UNESCO Strategy for Technical and Vocational Education 2016 - 2021
Education (Scotland) Act 2016
Community Learning and Development (Scotland) Regulations 2013
Developing the Young Workforce 2014 - 2021
Curriculum for Excellence: Education Bill Policy Ambition - joint agreement
National Indicator for Skills profile for working age population aged 16 - 64
The Scottish Government Gaelic Language Plan 2016 - 2021
Outdoor Learning Strategy for Highland's Children and Young People 2012 - 2015
Community Learning, Development and Engagement Plan 2018 - 2021

2.2.3 Maintaining employment opportunities for young people in rural areas through appropriate training provision

There is a need to maintain employment opportunities for young people in rural areas and support pathways for the transition from school into further education/higher education and employment (Jentsch, B. and Shucksmith, M. eds., 2017). It should be noted that Skills Development Scotland identifies skills gaps in terms of the qualification levels of 16 to 24 year-olds in Scotland. Nationally 6% of this age group have no qualifications. However, this is highest in Dumfries and Galloway and the Highlands and Islands which both sit at 9% (SDS, 2017).

This evidence suggests there is a need to further reinforce and identify pathways to enhance qualifications for young people in rural Scotland which could be achieved through stronger partnerships between Skills Development Scotland schools and industry.

2.2.4 Career Pathways

This scope will focus on interdisciplinary learning for vocational pathways and how they can be ameliorated through existing curricular activities within the senior phase of high school. Gaps identified will be highlighted to explore new ways of working to further embed peatland learning through the launch of peatland units and educational artefacts.

To underpin these principles it should be noted that peatland themes must be considered from the broad general education (BGE) phase which runs from early learning (age 3) to the senior phase of High School (S4). The BGE phase aims to:

- achieve the highest possible levels of literacy, numeracy and cognitive skills
- develop skills for learning, skills for life and skills for work
- develop knowledge and understanding of society, the world and Scotland's place in it
- encounter challenge and success so that learners can develop well-informed views and the four capacities (successful learners, confident individuals, responsible citizens, effective contributors)

(Education Scotland, 2010)

Implementation can be achieved in the context of outdoor learning which supports the Curriculum for Excellence (CfE). However, progression to the senior phase should be carefully considered so that the context is embedded into activity that raises awareness of the vital role and function of peatland for biodiversity, soil carbon storage and hydrology.

3. Method of Working

3.1 Review of current literature

This section aims to explore current literature and studies that examine peatland as a broad context for further education in vocational skills. The review will explore pedagogy in terms of achieving sustainability through best practice and use of appropriate methods of delivery for teaching and learning. Findings from desk based research will provide a rapid review of research to map fields of study where it is difficult to visualise the range of information that might be available (Arksey and O'Malley, 2005:6). This evidence will be further triangulated through scoping interviews and interviews with key informants.

Byg et al. (2017) found that public perceptions towards the value of peatland in Scotland can be multiple and ambivalent. The authors assert that finding mechanisms to attend to this ambivalence can support positive steps for peatland conservation practice and ecosystem restoration. This view presents a prime opportunity for educators to engage with the situation through introducing peatland learning into a variety of settings from early years to postgraduate education.

Calhoun et al. (2003) describe the US-based Wetland Connections project which links University and High school students to learn in an authentic wetland context. The project concludes a variety of benefits from experiential problem-based learning, however it focuses on monitoring and geoscience skills with little focus on the wider benefits of outdoor learning or vocational skills. The project highlights additional conservation benefits from long term site monitoring through the educational project. Smyth et al (2015) note that the need to encourage long-term monitoring of sites can be impeded by lack of funds. Educational projects could therefore add value to monitoring by providing a framework for long term study and baseline monitoring in small, localised contexts.

Waylen at al. (2016) present a different perspective of peatland as a cultural ecosystem service. The authors note its importance in terms of using moorland for outdoor classrooms and lifelong learning. Further to this, peatland restoration is commended as an opportunity to integrate learning partnership opportunities that will lead to an active involvement with peatland landscapes for recreation and conservation (ibid, 2016:124).

However, whilst there is some evidence to show that peatland education programmes are used in natural sciences there appears to be little study within current literature that relates to peatland as a context for vocational learning activity. In 2015 UNESCO

formalised and agreed 17 sustainable development goals (SDG). The SDG4 outcomes 4.3, 4.4 & 4.7 focus on achieving sustainability through vocational education (McGrath and Powell, 2016). This formalised, global framework could present a good starting point for vocational learning activity through a peatland lens.

In Europe the greening of vocational education is described as a fundamental means to ensuring the readiness of the workforce in the green economy. It is noted that in the UK the green economy has grown exponentially over the last ten years and continues to rise, yet there is little readiness to green vocational education (Papakitsos et al, 2018). The report concludes that investment in education to broaden choices and highlight opportunities in the green economy will be best achieved at local levels to promote new economic activity.

McGrath and Powell (2016) note a disconnection between vocational education training and the UNESCO sustainable development goals. Whilst the authors assert the need to address vocational training for sustainability in developing countries, they also note a need to achieve this in richer countries where austerity measures have created an equity gap between rich and poor. They posture the notion of human development (ibid, 2016:8) as a means to re-imagine vocational education training.

This concept is considered by Aswani and Djatmiko (2016) who suggest a philosophical change brought about by the adaptation of environmentally friendly knowledge into vocational practice will enhance skills for the green economy. This emerging area of research could present an opportunity to develop a peatland teaching resource to support learners to develop wider cognitive skills for sustainability whilst engaging with peatland restoration and similar environmental management practices.

Policy and curricular approaches to learning generally support experiential learning for sustainability within an authentic context. However, Loynes (2018) suggests a more prudent approach to the "leave no trace" engagement with environmental education in the field. He notes that educators should be aware that travelling into wild places can often impact the environment through a number of ways such as road transport or impacts of access. The author suggests "leave more trace" as a preferable ethical standpoint to acknowledge the impact of the educational activity, whilst looking to adopt ways to minimise those impacts and enhance the environment.

It must be considered that as budgetary pressures can limit the ability to carry out fieldwork there may be simulated contexts (Oliver et al, 2018) or digital alternatives such as augmented reality that can support peatland learning. A suggested framework is offered by Deepman et al. (2017) who specify the key role of digital open educational

resources (OER) and open educational practice (OEP) to support the outcomes of UNESCO SDG4 in terms of social justice and open, free access to learning resources. The use of digital, open source resource could support a low impact way of learning that maximises opportunity for a variety of learners to engage with peatland learning.

Current literature indicates a growing pressure to increase class sizes and reduce costs in the delivery of vocational authentic learning within rural and agricultural skills (Deegan et al, 2015; Monaghan et al, 2015). Biggs and Tang (2007) assert that online teaching is the answer to large classes, yet suggest that this can lead to a "one-way transmission" if pedagogy is not sufficiently robust. This is echoed by Ravenscroft and Cook (2007) who suggest that situated learning can be enhanced by technology "through adapting, or 'tuning', relatively generic yet flexible tools and models within authentic contexts of use."

The use of meaningful, relevant OERS and data is important to the success of a learning resource within a vocational context where the acquisition of practical skills and competencies is the overall aim to be achieved through learning outcomes. It would appear that this model is optimal when delivered in partnership between learners, academic institutions and industry. This can improve the quality of resources which are delivered as OERs (Cannell et al., 2015; Ravenscroft and Cook, 2007).

Although literature indicates there are some educational programmes that focus on peatland learning it tends to centre on the disciplines of pure sciences and geography. Policy for sustainability in education and environmental management presents an opportunity for vocational, academic or cultural learning opportunities in peatland to be enhanced. This potential of interdisciplinary learning can enhance learning outcomes and encourage innovative partnerships between schools, academic institutions, employers and conservation agencies.

3.2 Identification of existing relevant educational frameworks in Scotland

Considering the emergent growth of the green economy and the potential to restructure vocational education to nurture awareness of sustainability new, innovative approaches to learning must be considered.

In order to understand current practice within Scottish schools a review of current qualification frameworks and modules was undertaken through a search of the Scottish Qualifications Authority database (SQA), The National Occupational Standards

(NOS) database, the Lantra awards database and through interviews with key informants (see Section 4.1).

The assessment identifies the relevance of the adoption of peatland learning in specific areas of inquiry which could support a framework to implement vocational and academic peatland learning in schools.

3.3 Exploring demand/interest in schools/colleges and potential partners

Pedagogical practice will be explored through interviews to identify gaps in the evidence base where no research has been conducted (Arksey and O'Malley, 2005:7). Although the study is limited by time and breadth of the scoping it is reasonably concluded that this can provide a snapshot of demand which could apply to other schools that wish to deliver training in a peatland context. Initial consultees were identified and classified from a purposive sample which focused on Ullapool High School in the county of Ross-Shire, Scotland.

The school serves a catchment area that runs from Assynt in the North to Dundonnell in the South. The area is classified as remote and rural (Scottish Government, 2012) and the landscape is characterised by wild land of which over 111,000ha is classified as Wild Land (SNH, 2014).

Ullapool High School (UHS) was chosen as a focus for the scoping due to its long-term commitment to outdoor learning and rural skills within the curriculum. Over a period of 12 years the school has delivered Rural Skills at NVQ Int 1 & 2 and SCQF 4 & 5 levels and since 2011 has delivered Rural Skills Skills for Work in partnership with West Highland College. The school has also won the Lantra Rural Skills School of the year in 2015 and 2016.

i) Schools: Ullapool High School Head and relevant teaching staff, Highland Council strategic curriculum staff, Scottish Qualifications Authority verification staff, current and past rural skills students.
ii) FE Colleges: West Highland College course leaders and curriculum staff based in Ullapool, Portree, Auchtertyre and Fort William.
iii) Potential partners: Employers, contractors, third sector and stakeholder organisations.

Qualitative data was derived from key informants during initial scoping conversations which were followed up by in-depth interviews to map themes.

4. Findings from desk based research and interviews with key informants

4.1 Review of existing qualifications and resources that lend themselves to peatland learning

In order to identify potential curriculum areas to embed peatland learning further initial information was gathered from desk based research using the SQA website, the National Occupational Standards (NOS) online repository and general internet searches for training in a peatland or moorland context. National Occupational Standards (NOS) detail what a person should know, understand and be able to do in order to be considered competent in any one aspect of their role. NOS are used to construct Scottish Vocational Qualifications and, in turn, are a key component of related Modern Apprenticeship frameworks.

In order to capture more information and gather further appropriate data were conducted with curriculum leads in the Highland Council and UHI West Highland College, teaching staff from Ullapool High School and from the John Muir award team. Additional information was obtained through meetings with representatives from Lantra and SQA. The following list is based upon qualifications and national occupational standards that align with vocational skills that could be applied to a peatland context.

Table 3: Curricular and Vocational qualifications that align with peatland learning

Awarding Body	Framework	Peatland learning potential	Approach to Learning
SQA	Skills for Work Rural Skills SCQF Level 4	Modules do not lend themselves specifically to peatland learning, however the non-livestock route focuses on crop production and soft landscaping. These principles could be applied through the creation of an optional module route to peatland restoration in terms of moorland management, forestry and restoration techniques.	Vocational skills based, outdoor context.
SQA	NPA Rural Skills SCQF Level 5	Mandatory unit covers Rural Business Investigation which lends itself to a sustainability theme. Additional optional units can cover forestry and soft	Vocational skills with outdoor and indoor learning.

		landscaping. Potential to include peatland learning within existing modules.	
SQA	NC in Countryside Management Level 5	Three units within the certificate lend themselves well to the context of peatland. Specifically principles of biodiversity conservation, habitat management and assessment	Vocational skills base elements of which can provide progression routes, but not all units within the award are appropriate for peatland.
SQA	National 4 Environmental Science National 5 Environmental Science	Investigating the carbon cycle, the natural greenhouse effect, the sustainability of key natural resources. Climate change investigation through a peatland context is supported by teaching resources from Loch Lomond and Trossachs National Park.	Experiential, active learning through field trips and collection of data.
SQA	Higher Geography SCQF Level 6	The assignment component of the award could lend itself to peatland learning as a field study. There is existing support material produced by the National Parks Authority "More than Just a Bog". In addition field resources to support quadrat analysis could be used at a higher level and also by students in vocational contexts using field identification techniques.	Fieldwork skills in outdoor context to carry out investigative research project.
SDS	Modern Apprenticeship in Rural Skills SCQF Level 5, 6 & 7	Mandatory Units can focus on environmental conservation or estate management. Can provide progression routes to FE and HE. MA in Rural Skills at SCQF level 5, incorporates estate maintenance and therefore aligning with estate workers. Other MA frameworks, for example Tress & Timber, Agriculture and Game & Wildlife	Flexible learning can be done through face to face CPD or distance and online, therefore lends itself for peatland

		Management, might usefully accommodate peatland management (as might the new higher, or Technical level, framework in Rural Land Use and Management, SCQF level 8, scheduled for delivery from 2019).	learning using OERS/ blended learning.
The John Muir Trust	John Muir Awards	Discovery, Explorer and Conserver levels can introduce learners to wild places and ranges from a short term commitment (4 days) up to a 20 day, or six month commitment. This can be applied in the BGE phase of education to the senior phase and lends itself well to peatland learning through active conservation and presentation of findings.	Outdoor context, which can integrate an environmental approach to existing learning.
D of E	The Duke of Edinburgh Awards	Bronze, Silver and Gold awards for learners aged 14 and up. Awards focus on expeditions, volunteering and skills	Outdoor context, which can integrate an environmental approach to existing learning.
NOS	NOS (LANEnC3) Survey and Report on the condition of the environment	Using basic survey techniques to map or monitor the natural environment using biodiversity field guides and keys. Surveys could be used to map peat depths, monitor grazing on moorland or map footpaths and public access to a site.	Using primary and secondary data in a vocational, field based setting.
NOS	NOS (SKAAL11) Contribute to environmental conservation	Ecological management of outdoor areas, effective use of resources, provide information and advice on environmental conservation. Aspects of the NOS lend themselves to a peatland context.	Vocational skills that could complement restoration techniques.
NOS	NOS (LANCS36) Carry out work to create or	Understanding key biodiversity information about a site to carry out practical tasks which could include a number of peatland	Vocational skills for peatland restoration.

	manage habitats	restoration skills: manipulation of water levels, erosion control, scrub control.	
Lantra Awards	Lantra awards 360 deg Excavator	Machine operator course that could support skills for work in peatland restoration. This qualification does not have a greening element, therefore would be most appropriately delivered alongside peatland specific training.	Vocational, accredited skills.
Lantra Awards	Lantra awards chainsaw maintenance, cross cutting, felling and processing of small to medium trees	Vocational training for operator ticket, could support removal of scrub species and conifer trees as part of a peatland restoration. In addition hand felling skills to utilise trees to block peatland drainage systems to raise the water table for restoration.	Vocational, accredited skills

The scoping is by no means exhaustive and is limited by the nature and the scope of the study, however, the scope gives a general appraisal of the relevant qualifications that pupils in the senior phase may engage with at different curricular levels (Scottish Credit and Qualifications Framework). Kevin Patrick, Rural Skills Development Manager at Lantra, points out the dual function of Lantra within its charitable objects to support the development of skills standards through the NOS and its commercial arm, to promote diverse and rewarding careers across the land-based sector; to help influence relevant skills policies and interventions, and to help ensure that relevant standards, qualifications and apprenticeships remain 'fit for purpose'. Also to develop and maintain a commercial technical training portfolio that supports workforce training and business development.

Further to this, Lantra are currently working on a proposal to review the Environmental Conservation NOS and the Rural Skills Modern Apprenticeship which could present an opportunity for IUCN PP UK to embed principles of good practice in peatland management within vocational practice.

There is scope to deliver aspects of peatland learning through the medium of rural skills lessons and schools in Highland. Relevant schools were identified by Don Esson, Education Quality Improvement Manager of the Highland Council via an email enquiry sent out which identified at least 9 schools which currently deliver Skills for Work Rural Skills Level 4 or National Progression Award Rural Skills Level 5. There may be more

schools involved than this and as such, those who were unable to respond to the enquiry may still come forward:

- Ullapool High School in association with UHI West Highland College
- Thurso High School in association with UHI North Highland College
- Kingussie High School in association with UHI Inverness College
- Inverness Royal Academy in association with the Scottish School of Forestry (UHI Inverness College)
- Kinlochbervie High School
- Kilchuimen Academy, Fort Augustus
- Farr High School
- Golspie High School in partnership with Scottish Forestry (Formerly Forestry Commission Scotland)

(Esson, 2019)

The Rural Skills Skills for Work at Level 4 comprises core modules in Rural Estate Maintenance, Employability and Land-based careers. Optional routes are either livestock or arable modules with a total of 4 credits being the minimum pass requirement for certification. There is no specific reference to peatland or moorland context, yet there is scope to embed peatland learning into this module either through an agricultural or land management route.

Much of the design of the SQA course was intended to be run on a co-operative model between schools and employers, however more recently this has been delivered in Ullapool jointly between UHI West Highland College, Ullapool High School and a range of local employers. Since the inception of the course in 2007 class sizes have ranged from 6 to 15 and students have been generally drawn from the Ullapool High School 5th and 6th years, the course is also open to adult learners. The cohort is drawn from a predominantly remote and rural locations in the Highland region. From the most Northerly point, Stoer in Sutherland to the most Southerly point, Dundonnell in Wester-Ross.

There are no pre-entry requirements although it is expected that learners will build upon previous learning in school and work towards achieving cross-curriculum learning in accordance with the Curriculum for Excellence. Much of the activity is situated learning based upon authentic, workplace activity and assessment is field based with the exception of the land-based careers module which is assessed via the

presentation of a personal project which can be presented in written or multimedia format.

The overall purpose of the programme is vocational: to enable students to be ready for work in this sector or to move onto progressive study routes within the rural sector. Previous students have continued to NPA Rural Skills at Level 5, direct to employment, apprenticeship, HND or degree level study in Agricultural science.

SQA note in their external verification of the Skills for Work National 4 Rural Skills that it is a "popular vocational course….uptake is steady despite funding difficulties in the college sector" (SQA, 2017). There will be a review of the Rural Skills, Skills for Work group award undertaken in autumn 2019 which presents an opportunity for vocational peatland learning to be included within this scope.

Discussion through in-depth interviews with curriculum staff and teaching staff illuminated both positives and negatives of existing frameworks.

Table 4: SWOT Analysis of Existing Qualifications for Peatland Learning

STRENGTHS	**WEAKNESSES**
• Known accredited frameworks • Quality assurance improves student outcomes • SQA Credit value can attract core funding • John Muir Award supports curriculum for excellence to senior phase • Vocational awards can increase employability through acquisition of job related certificates of competence • Skills for Work group award supports learning in an authentic workplace environment which adds value to learning activity • Curriculum frameworks gives teachers tangible, measureable outcomes and objectives	• No peatland specific modules • Lack of flexibility for interdisciplinary learning within some modules and group awards • Timescales for creating a new module and verification can be lengthy • There are barriers to uptake of Modern Apprenticeship in more remote areas due to lack of employer capacity to deliver placements • Lack of suitably trained vocational tutors in area • There are limited budgets to develop new ways of learning in a localised context • Teacher freedom for creativity can be limited by modules

OPPORTUNITIES	THREATS
• Existing rural skills modules are due to be updated in Autumn 2019 • There is scope to develop peatland learning course as a trial to develop new module and learning outcomes for peatland modules • Possibilities of linking academic and vocational learning in real world contexts • There is value to be gained through linking school activity with academic institutions through specific projects or further education initiatives such as SfW and NPA • Additional accreditation through added value modules can help to close the attainment gap in rural schools • The challenge of falling school rolls is an opportunity to look at innovative methods of delivery	• Lack of core funding for additional teachers and on costs • Funding for rural schools is directly linked to school roll, therefore subject to falls where there is population decline • Changes in Curriculum for Excellence could change known frameworks of delivery and assessment • Political changes could change focus of environmental objectives • Fast pace of greening technology and environmental education could mean that modules become easily outdated

The SWOT analysis highlights the need to develop a peatland route for learners that can be informed by forming strategic partnerships between curriculum staff, schools, academics, employers, stakeholders and conservation bodies. This could be piloted to develop a peatland pathway rooted within rural skills or countryside management. In order to attract core curricular funding to ensure future sustainability of a peatland-specific qualification nationally it is recommended that a development opportunity application be submitted to the SQA. This could lead to the next stage for academic scrutiny of a group award or unit proposal which must be backed by a strong business case.

Discussions with John Salter (SQA) and David Grant (SQA) indicate that although current routes of progression are linked to learning themes that align with peatland a

more robust framework could be developed which John Salter (SQA) pinpoints as a potentially new award:

"National Progression Award in Environmental Conservation – Peatland at Level 5

Three units might include: Principles of Biodiversity Conservation FV30 12 (core); Practical Conservation: Habitat Management in Scotland FV5H 11, or, Practical Habitat Management FV4F 12; Habitat Assessment FV42 12."

The National Progression Award (NPA) is rooted in practical activity and provides a suitable learning pathway for senior phase high school students who may have studied rural skills at level 4. It would appear that currently there is a gap in provision and there is a need to develop and refine learning outcomes, national assessment banks (NABs) and to curate and develop teaching materials to enhance pedagogic practice.

4.2 Mapping learning themes that have potential to benefit from peatland

In terms of learning for sustainability the UNESCO sustainable development goals and current literature point to a need for a convergence for sustainable learning at an academic, philosophical and vocational level. There is a case to recognise that learning through a peatland lens provides a context for experiential learning in vocational skills for biodiversity, carbon sequestration and hydrology.

Peatland presents an opportunity for outdoor learning which can enhance key pedagogical processes at academic and vocational levels within the curriculum for excellence (SNH a, 2014). Fieldwork can be used to increase curiosity and responsibility for self-directed learning in an authentic context whilst achieving interdisciplinary learning through a variety of routes (Clarke, 2019).

The John Muir Award provides a platform for learning in many contexts: science, literacy, art, history and physical education. Peatland is noted by Toby Clark of the John Muir Award team as a resource for learning - including biodiversity, carbon sequestration, cultural heritage, clean water and flood alleviation. Beyond this he sees it as a context to inspire curiosity in learners and help connect people with nature.

4.3 Routes of progression

Interview data revealed that strategic partnerships are recognised by schools, colleges and employers as a route to enhancing learning and improving employability in a variety of career pathways.

Table 5: Routes of progression in a peatland context

Vocational Skills	**Professional Services**	**Cultural**
Digger work: Heavy machinery contracting for bog re-profiling and ditch/gully blocking work: excavators, mulchers, forestry harvesters, using diggers to gather transplant materials to encourage revegetation of bare peat.	Ecological monitoring: biodiversity, flora and fauna. Silvicultural surveys to determine species and yield class of trees on peatland.	Cultural heritage: closely linked to provisioning aspect of peatland (Grazing and peat cutting). New focus explores restoration as a means to enhancing social value through volunteering opportunities.
Forestry: Removal of scrub and woodland, Small scale tree felling, creating mulch mats and blocking drains by felling discrete blocks of timber on peatland.	Peatland condition monitoring: using drone technology, GIS, peatland mapping and depth surveys.	Gaelic: language, poetry and song associated with peatland that embeds Gaelic language into practical peatland applications.
Path building: building and maintaining paths and boardwalks to support public access to peatland.	Academic and scientific study relating to peatland.	Visitor services: using graphic communication to create infographics and signage and ranger walks.

The IUCN PP UK commitment to deliver peatland training aims to enhance learning opportunities to develop a strong understanding of functional peatland ecology. Although challenges to peatland restoration tend focus on stakeholder engagement and uptake (Andersen, 2017) there are challenges that exist in terms of finding suitable contractors to undertake the work in Scotland (Lochaber Fisheries Trust, 2019).

This perceived gap is supported by the view of local contractors (Dorrian, 2019 Renwick, 2019) who are finding it harder to take on apprentices who have suitable outdoor experience and background training. This training gap should be noted as an opportunity for curricular enhancement to support a variety of career pathways and vocational skills to support the green economy (McGrath and Powell, 2016).

Current literature suggests that greening needs to be embedded into vocational learning for sustainability globally and nationally (McGrath and Powell, 2016). Furthermore, the growing green economy presents an opportunity to bridge the attainment gap allowing more opportunity for school leavers to leave with a qualification that can be used in future employment. This view is supported by the Head of Ullapool High School. A recent student consultation carried out in 2016 identified the following themes which have been formalised within the school's mission statement as "WE REACH":

Well-being

Equality

Respect

Environment

Ambition

Community

High quality learning and teaching

(McFedries, 2019)

Peatland education has a particular relevance to well-being and environment in terms of its value for sustainable in environmental education disciplines: biodiversity, water and climate (Smyth et al., 2015). In addition its use as a context for an outdoor classroom (Education Scotland, 2010) can provide opportunity for physical exercise and mental well-being through accessing a wilderness landscape. This further supports the principles of the John Muir Award which encourages engagement with a wild place to engage in active learning for conservation.

4.4 Mapping Existing teaching materials

The scoping examined resources from the IUCN Peatland Project, the John Muir Trust, the National Park Authority, Loch Lomond and the Trossachs National Park, the James Hutton Institute, Scottish Natural Heritage, Irish Peatland Conservation Council, TES, RSPB, BBC Alba and The British Dragonfly Society. The list is not exhaustive as other resources aimed at further or higher education could reveal resources that could be repurposed for use in secondary education.

Resources were classified using thematic analysis proposed by Smyth et al (2015:133) and grouped according to its relevance for learning in a peatland context: Vocational skills, Environmental (water quality regulation, climate regulation, flood management, biodiversity), Cultural (recreation, culture and history), Provisioning (upland agriculture and food).

Table 6: Peatland teaching resources

Organisation	**Resource Link**	**Themes**	**SCQF Level**
IUCN	Peatlands are Special	Environmental, cultural, provisioning	n/a
Loch Lomond and Trossachs National Park	Biodiversity and Climate change education pack	Environmental	4 & 5
National Parks Authority	More than just a Bog education pack	Environmental, cultural, provisioning	6
SNH	Peatlands: A guide to educational activities for schools	Environmental, cultural, provisioning	CfE to 6
SNH Peatland ACTION	Peatland Action Video playlist: general information and training videos for vocational skills	Vocational, environmental, cultural, provisioning	n/a
James Hutton Institute	Peatland Restoration 360 degree film	Environmental	n/a
University of Leeds	Peatland Learning Module	Environmental	n/a

Moors for the Future	Factsheets and biodiversity monitoring	Vocational, environmental	n/a
Irish Peatland Conservation Council	Habitat guides and keys	Environmental	CfE to 4 & 5
RSPB	TES educational resources	Environmental	CfE
BBC Alba	Archived learning resources in Gaidhlig for Peatland	Environmental, Cultural	CfE
British Dragonfly Society	Keys and identification guides with Gaelic language translation	Environmental, Cultural	n/a
OWL Outdoor and Woodland Learning Scotland	Tree measuring, climate change, forestry	Environmental, cultural, provisioning	CfE to 6
IUCN Top of the Tree	The Carbon Farmer, short film set in the future envisages carbon farming being integrated into mainstream land management practice	Vocational, environmental, cultural, provisioning	CfE to 6
IUCN	Eyes on the Bog: citizen science monitoring resource currently in development	Vocational, environmental,	CfE to 6

This suggests that there are a number of resources that can embed peatland learning into core curricular subjects such as biology, geography and environmental science, however, there are gaps when it comes to vocational skills.

Table 7: SWOT Analysis of existing teaching resources

STRENGTHS	**WEAKNESSES**
• Well researched material that aligns to specific subject and curriculum areas • Specialist knowledge resources for species specific knowledge • A variety of subjects within science, culture and language • Uses exiting partnership working between academia, national parks and third sector conservation organisations • Off the peg teaching resources save time • Teaching resources with multiple stakeholder input have added value • Written resources can be easily adapted by teachers into bespoke lesson plans	• Resources tend to be held in a variety of places, there is no single peatland education repository • No specific resources for accredited vocational education • Not many blended learning artefacts • Some resources may need to be updated as curriculum areas change • Readily available teaching resources cannot be used in isolation without appropriate staff CPD • Digital resources have little scope for adaptation by teachers • Curriculum too stretched within school for additional activity
OPPORTUNITIES	**THREATS**
• Signposting teachers to existing resources to further embed peatland learning in core curriculum subjects • CPD opportunities for teaching staff • Creating digital resources for use in a blended learning environment can save resources, money and time • Scope to develop digital learning artefacts can create resources for kinetic learners which lends itself well to a vocational context	• Fieldwork challenges may include access issues to bog land which can be challenging due to either distance to travel to sites or environmental damage on sites due to trampling • Resources created for a localised context may not have regional or national significance • Existing learning resources may become outdated • Without a central point for resources on peatland learning

• Scope to develop blended learning programmes that minimise environmental impacts and add value to collective teaching resources • OERS can be adapted by teachers and used in a variety of settings and age groups	there is a piecemeal approach to curation of learning resources • Falling school roll and budgets impacts upon teacher's ability to create new learning resource for peatland • Quality of resources could be diverse

The analysis indicates there is a need to develop a repository to hold and signpost peatland learning resources. This could be achieved via the IUCN PP UK webpage which can be linked to via other sites to increase availability to educators. This could be done, for example by creating an IUCN Peatland Project account on TES.com teaching resources or open source teaching resource hosting platforms such as OER Commons.

4.5 Demand/interest in schools/colleges and potential partners

Scoping identified key informants who were contacted initially to determine relevant key objectives and themes. These informants were contacted at a later stage within the scoping once more information had been identified and were interviewed using a semi-structured format.

Table 8: Key informants

Schools and Curriculum	Academic Institutions	Potential Partners
Robbie McFedries, Head, Ullapool High School, Ullapool	Shaun Escott, Curriculum Area Lead, UHI West Highland College	Toby Clark, John Muir Award Scotland Manager, John Muir Trust
Jemma Middleton, Rural Skills and Outdoor Learning Teacher, Duke of Edinburgh Award Leader, Ullapool High School	Tracey Matheson, Quality and Registry Manager, UHI West Highland College	John Low, Policy Team, John Muir Trust

Claire Cormack, Geography Teacher, Ullapool High School Susan McSweeney, Acting Head, Badcaul Primary, Dundonnell	Alan Ogg, Project Director, STEM, UHI West Highland College	
John Salter, Senior External Verifier (Rural Skills, Biological Sciences and Environment), SQA David Grant, SQA Awarding Body	Emily Taylor, General Manager, The Crichton Carbon Centre	Natasha Hutchison, Project Officer, Wester-Ross Biosphere
Don Esson, Education Quality Improvement Manager, The Highland Council	Richard Lindsay, Head of Environmental and Conservation Research at University of East London	Sarah Proctor, Communications Manager, IUCN PP UK
Kevin Patrick, Rural Skills Development Manager, Lantra	Susan Nicol, Lucy Ballantyne, Lochaber Peatland ACTION	Farquhar Renwick, Foresthill Contractors, Achnasheen Simon Venters, Ardgay Contracting, Ardgay Sutherland

Peatland as a Learnscape

Peatland is a global, authentic context rich in visual, cultural and scientific data. Richard Lindsay of the UEL Sustainability Institute defines the richness and scale of peatland learning from the micro: "crouching down to observe the small scale beauty of carnivorous plants and sedges" – to the macro: viewing peatland from the observation tower at Forsinard, or aerial photos "as if you were a golden plover flying and observing the patterns and amazing landscapes of peatland."

Programme Management and delivery of a pilot through critical partnerships

Interviews indicate that peatland learning could present many opportunities for schools to jointly deliver learning through critical, dynamic partnerships with colleges and industry. Further education colleges see the development of peatland learning as an opportunity for learners in school and further education settings for adult learners as resources can be linked to vocational skills for work.

School staff envisage partnership working as the primary driver to success in order that stronger links can be made to foster routes of progression in vocational education. Colleges and schools work together already to deliver a suite of skills for work awards which is a well-established method of delivery. This is seen by Robbie McFedries, the Head of Ullapool High School, as a way to add value to the school offering as well as to the wider community.

The UHI West Highland College quality and curriculum team note the potential to work with a school partnership to develop draft module learning outcomes and assessment criteria to create an internal module. This can then be presented to UHI for academic scrutiny. This process, according to Tracey Matheson, Quality and Registry Manager at UHI West Highland College, can take a number of weeks to be scrutinised for internal verification.

An internal module could be relatively quickly developed and refined for submission to SQA. SQA ratification takes a longer time and in some cases can be up to a year. The process is detailed in the SCQF Handbook (2015) which outlines the following steps to develop a module:

- Develop learning outcomes
- Determine the appropriate SCQF level
- Determine notional learning hours for each module, 10 notional learning hours equate to 1 SCQF credit point
- Determine assessment procedure and instruments of assessment
- Quality assurance through internal and external process

Early discussions with John Salter and David Grant of the SQA indicate their general support for the proposal. Further to this John Salter has indicated a willingness to be part of a collaborative stakeholder panel to advise and shape a proposal developed as part of a pilot. A small scale, high impact pilot that centres on Ullapool has the potential to develop a longer term project that involves multiple partnership working and is adopted in other schools nearby. This view is supported by teaching staff, curricular staff and potential employers. A potential mechanism to develop this could

be through a collaborative action research project (Education Scotland, 2015) which would ensure a wider collaboration that could develop a qualification that could be used nationally.

Academic Links

Teaching staff see the potential of integrating peatland as an authentic context for learning in biology or geography. One example cited by Claire Cormack, Geography teacher of Ullapool High School, is the assignment component of Geography Higher. In this assessment students identify a geographical topic or issue which is investigated using information from a range of sources including fieldwork. In the past Ullapool High has undertaken projects in partnership with academic institutions to look at soil science and Claire sees an opportunity to introduce peatland as a topic which could be investigated using an academic partnership model.

Current institutions which can provide links include The University of East London The University of the Highlands and Islands, The James Hutton Institute and The Crichton Carbon Centre. Third sector species-specific conservation agencies such as RSPB, British Dragonfly Society, and Butterfly Conservation Scotland could provide additional support and expertise.

Curriculum for Excellence (CfE) Links

The Ullapool High School has a large catchment area within a landscape that lends itself to Peatland learning. Associated Primary Schools include 201 pupils: Ullapool Primary (English and Gaelic Medium), Badcaul Primary, Achiltibuie Primary, Scoraig Primary and Lochinver Primary.

Schools within the catchment currently engage with the John Muir Awards as part of their wider CfE and outdoor learning activity.

Image: Ullapool High School Prospectus

Peatland can supports a range of CfE activity and is seen by the schools as a useful context to engage in intra-school learning activities in STEM subjects. Future developments from Richard Lindsay will offer open source material in the form of digital artefacts that ca be adapted to different learners.

Badcaul Primary is hoping to engage with the Ullapool High School to work with older pupils to deliver a project examining alginates in the marine environment in terms of pH in soil and peat. This project is still in development and could align with peatland learning activity.

Jemma Middleton, Outdoor Learning Teacher at Ullapool High School, has indicated that S3 learners at Ullapool High undertake a ten week block for outdoor learning. This could provide a space to pilot peatland learning for learners moving on to the senior phase.

Greening of Vocational Education and Training

The greening of vocational education is an emerging area of research that can support learners to develop wider cognitive skills for the growing green economy. Methods of delivery tend to be field based and experiential; however economic and environmental factors can prompt the need to find new ways of teaching field based vocational skills.

The Skills for Work Rural Skills group award is due to be reviewed this autumn and the findings of a potential pilot in peatland could be used to feed into modules that connect learners with vocational learning in upland agriculture. The green economy is growing and employers indicate there is a shortage of skilled contractors and younger apprentice workers who can get involved with peatland restoration. This need links with initiatives in the Highland region such as "Developing the Young Workforce".

Current modules within rural skills that centre on Rural Estate maintenance and agriculture could begin to explore the concept of "Paludiculture". This is highlighted by Richard Lindsay as an opportunity to learn about carbon farming through PES which has a strong relevance to upland agriculture which could give an opportunity to develop learning outcomes for sustainable agriculture and land management.

Although teaching staff see a formal module as being a longer term goal the school is keen to commence early engagement with peatland learning and would wish to be involved in a pilot commencing in the 19/20 academic year. There is scope to integrate peatland learning activity with outdoor learning and established citizenship awards such as the John Muir Award or Duke of Edinburgh Awards which could be run concurrent to existing awards such as Skills for Work Rural Skills at Level 4 or NPA Rural Skills at Level 5.

Use of sites for fieldwork

The concept of "leave more trace" cautions educators to be mindful of their actions. This view is supported by Richard Lindsay who points out the value of blended learning resources for a peatland context due to the challenges of access. Bog land can often be sensitive to trampling, which can be alleviated by using board walks to access flora and fauna at close hand. Further to this peatland sites can often be inaccessible to day visits as they may be located in remote and rural locations far from conurbations or public roads.

Fieldwork sites can however, provide an authentic context to learn vocational skills. This is noted by Farquhar Renwick who is a former Skills for Work Rural Skills student at Ullapool High School and now works on day to day peatland restoration projects. Farquhar sees the potential for schools to get involved through site visits observing daily restoration work and getting involved with re-vegetating operations using peat mosses or the hand removal of woody shrubs.

A one off lesson at Ullapool High was delivered in March 2019 to introduce the concept of peatland restoration was delivered by Dr Emily Taylor of the Crichton Carbon Centre in association with local Peatland ACTION officers Lucy Ballantyne and Susan Nicol.

The day took the form of a site visit and recording peat depths using a peat probe. This type of fieldwork contributed to a local peatland action site and shows the potential of school fieldwork to contribute to long term monitoring of sites.

The IUCN Citizen Science initiative "Eyes on the Bog" lends itself well to this type of fieldwork and would support core skills as well as wider community sustainability outcomes. Possible sites local to Ullapool for peatland monitoring have been identified as:

Isle Martin, by Ullapool: community owned island with strong links to Ullapool High School

Leckmelm Estate, by Ullapool: currently used as a venue for rural skills

Dundonnell Estate, Wester Ross: sometime used as a venue for rural skills

Braemore Estate, by Ullapool: opportunities for peatland learning

Strathvaich Estate, by Garve: opportunities for peatland learning on current restoration site

Achnasheen, South West Ross: current peatland restoration project that could provide site visits and employer links

Quinag Estate, Assynt: John Muir Trust land that could offer opportunity for school partnerships and level 6 apprenticeships

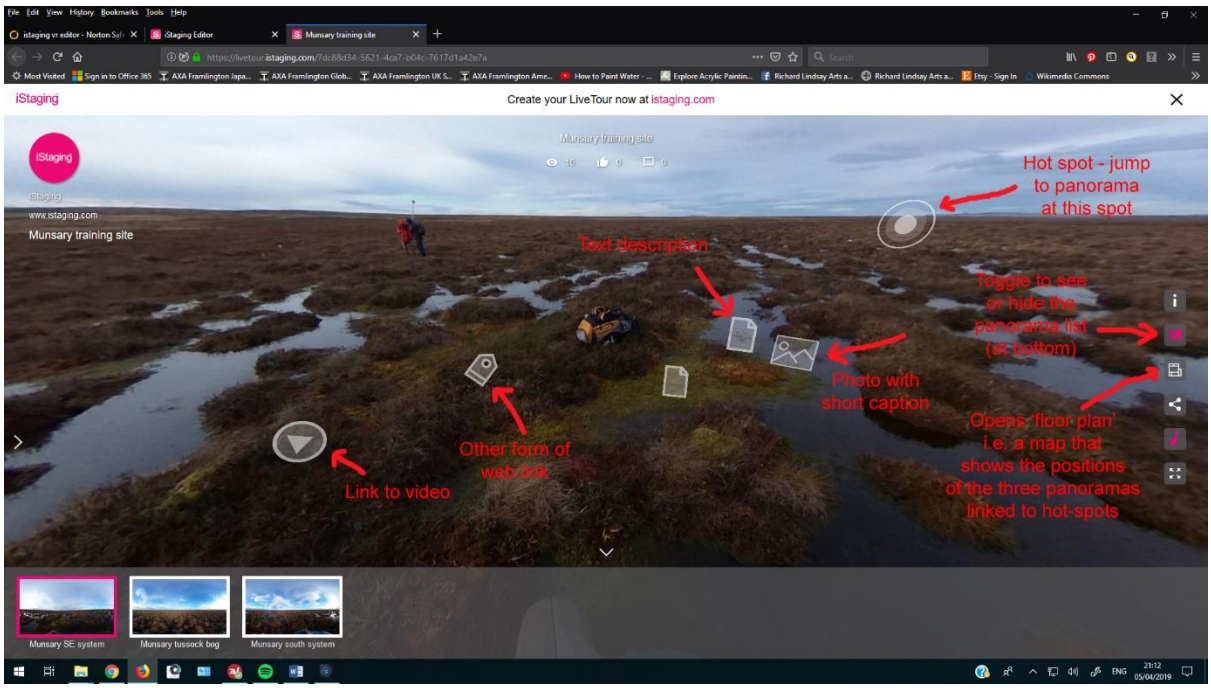
Inter-disciplinary workshops and site visits are proposed as a specific whole school activity during the suspended timetable week in May, or as day trips to support fieldwork that could involve a range of learners. This could involve a field trip to Forsinard Flows Nature Reserve in Caithness, or a longer residential visit staying at the Forsinard Flows field centre which accommodates up to 16 people. A residential visit can support learners engaging with the John Muir Award conserver level which could be particularly suitable for those in the senior phase of High School.

Open Educational Resources (OERs) and Digital Learning Artefacts

The review highlights the potential for the use of OERs for sustainability and social justice. The concept of "leave more trace" supports a blended approach to learning that can utilise digital technology, flipped classroom methods and fieldwork. There are examples in practice whereby existing OERS can be curated by teachers to use for classes and there are current developments being led by Richard Lindsay at the University of East London Sustainability Research Institute. Resources in development include an augmented reality peatland field visit using the IStaging platform which can

be used to familiarise learners with the peatland environment prior to going out on site.

Another platform, "Google expeditions" could also link with augmented reality. This is pertinent to schools in Highland who now use Chromebooks and Google Classroom in day to day learning activity.



Source: Richard Lindsay UEL

The use of OERs supports sustainability and social justice; however for school learners an appropriate balance of self-discovery and facilitated learning needs to be struck. Opportunities for CPD for teachers could enhance their understanding of peatland and how to use OERs to support a blended learning package.

5. Conclusion

Peatland offers a unique context for vocational, environmental and cultural education. This aligns with environmental and educational policy. At a civic level there is growing awareness of climate change and a desire to do something about it which has been clearly articulated by young people through the climate strike action. Peatland conservation and restoration at a local level can help to mitigate carbon emissions globally.

At a community level Schools in the Highland region have opportunities to integrate localised peatland learning partnerships between schools, academic institutions, third sector/Government conservation organisations and employers. Partnership working can be innovative and enhance delivery and quality of resources as well as providing CPD for teachers in a variety of academic and vocational disciplines. Additional environmental legacy benefits from this approach can be derived through the long-term monitoring of sites using citizen science techniques.

There is a disconnection between vocational education policy and sustainable development goals which presents an opportunity to educators. This is an emerging area of research and presents an opportunity to pilot a collaborative action research project to develop a peatland learning module to "green" vocational skills. There is a perceived lack of young people who have the right employability skills for practical peatland restoration which presents an opportunity for a pilot to progress suitable learning outcomes and enhance career pathways.

Although peatland is a "learnscape" for experiential hands-on learning there can be challenges presented by access issues. The use of digital artefacts to support blended learning supports the "leave more trace" approach to environmental education. Further to this sustainability and social justice can be achieved through the use of OERS which can be repurposed for a variety of needs. Education in rural areas faces challenges as falling school rolls increases budgetary pressure which can lead to a restricted school offering. Partnership working coupled with enhanced digital delivery is a possible solution but pedagogy needs to be suitably robust. This can be achieved through appropriate CPD and effective programme design.

6. Recommendations

There are some clearly defined actions that are recommended which the IUCN Peatland Programme in the UK could implement to support peatland learning at a national level.

Educational Stakeholder Engagement: The IUCN Peatland Programme UK can contribute to reviews of the Scottish Credit and Qualifications Framework (SCQF), National Occupational Standards (NOS), Scottish Vocational Qualifications and apprenticeship frameworks to ensure peatland learning is more fully embedded into existing frameworks, where suitable. It is noted that currently there are reviews due in SQA Rural Skills Awards and Lantra are working on a proposal to lead on the review of the Rural Skills Modern Apprenticeship and the Environmental Conservation NOS in 2019.

Peatland Learning Repository: Curate and update learning resources hosted on the IUCN Peatland Programme UK website. Resources can be categorised and linked according to discipline and curriculum-linked to ensure ease of use for teachers and educators. In particular links can be made according to SCQF framework which could be linked to equivalent levels in the key stages for national curriculum for England, Wales and Northern Ireland. This can be made available through signposting and creation of a dedicated portal on TES.com teaching resource database to link with a network of over 8 million teachers nationally and internationally.

Open Educational Resources (OERS): Learning resources that are developed by IUCN, or their partners that can be freely shared could be licenced under a creative commons licence for open distribution through the OER commons portal. This can include digital learning artefacts developed for the IUCN PP UK through the University of East London which encourages a "Leave more trace" approach to environmental education through virtual field exploration on I-Staging. This approach goes beyond "Leave no trace" in that it is mindful of the impact of travel to sites and damage through access can create. A digital resource that looks at sites from an aerial or microscopic perspective allows learners to engage with a peatland landscape at a macro and micro level thereby supporting a deeper level of learner engagement.

Peatland Learning Toolkit for Educators: Using existing resources IUCN could develop curriculum-linked infographics and accessible e-guides that can be downloaded and re-used by educators to support learning in key aspects of sustainable land management in peatland. At a vocational level these could detail

restoration and protection techniques that can guard against threats brought about through the use of peat in horticulture, loss of carbon, water quality and biodiversity.

Targeted approach to wider engagement with educators: The IUCN Peatland Programme UK could develop social media campaigns that emphasize key learning messages for the wider public that could link to an IUCN learning resource repository. These could target educators directly, for example, through targeted hashtags #edchat #edtech #EarthHourUK, further links can be made to conservation agency initiatives such as Scottish Natural Heritage (SNH) #PeatlandACTION and grassroots initiatives such as #gopeatfree.

The scoping review has revealed that peatland is an important landscape for education and that gaps exist in a vocational context. The following strategic themes are highlighted which support the need to investigate its potential further through the development of a pilot peatland learning collaborative action research partnership project that could be delivered in the senior phase of High School.

Additionality: Peatland learning is not supported in the core curriculum although it has scope to be embedded through interdisciplinary learning in a variety of academic disciplines (STEM, Cultural and Vocational learning).

Attainment: Developing learning strategies and formalising learning outcomes through the monitoring of a pilot rooted in collaborative action research that could build national units and awards to snowball the uptake of peatland learning in schools across Scotland.

Career Pathways: The green economy presents a challenge for educators to embed learning for sustainability to prepare learners for careers and establish partnership working with third parties and employers.

Vocational Education: there is a skills shortage and gap. Peatland learning could present a model for the greening of vocational education and training. This can be further enhanced by the IUCN PP UK feeding in to NOS, SVQ, MAs and SQA award reviews.

Legacy: Investing in a framework to embed peatland learning in the curriculum will bring together communities of practice, develop CPD for teachers and support long term monitoring of peatland sites. Changing public attitudes towards peatland could provide long term cultural change which can lead to more valuable interaction with environmental sustainability.

Social Justice: Curating and managing open education resources through a central platform such as the IUCN Peatland Project UK supports learning for sustainability and equity.

Environmental: A pilot project could support school learners to engage with positive environmental action for climate change which supports youth initiatives for environmental action.

There is a need to pilot and develop such an approach to develop and refine learning outcomes, national assessment banks (NABs) and to curate and develop teaching materials to enhance pedagogic practice which could deliver suitable stand-alone units or an NPA group award to support peatland learning in the senior phase of High School.

It is recommended by SQA that a development opportunity application be submitted to the in the first instance to assess its suitability. If such a proposal was accepted and approved by the SQA this could make future core funding available to schools and colleges via SCQF credit units. As such a targeted collaborative action research pilot would enable the development of a well-informed, robust learning product that links schools, academia, third sector and industry to enable the long term sustainability of peatland learning in a vocational context.

7. References

Andersen, R., Farrell, C., Graf, M., Muller, F., Calvar, E., Frankard, P., Caporn, S. and Anderson, P., 2017. An overview of the progress and challenges of peatland restoration in Western Europe. *Restoration Ecology*, *25*(2), pp.271-282.

Arksey, H. and O'Malley, L., 2005. Scoping studies: towards a methodological framework. *International journal of social research methodology*, *8*(1), pp.19-32.

Asnawi, R. and Djatmiko, I., 2016. A Challenge of Vocational Education for Preparing Green Employment. *Innovation of Vocational Technology Education*, *11*(2).

Biggs, J. and Tang, C., 2007. Teaching for quality learning at university (Society for research into higher education)

Byg, A., Martin-Ortega, J., Glenk, K. and Novo, P., 2017. Conservation in the face of ambivalent public perceptions–The case of peatlands as 'the good, the bad and the ugly'. *Biological conservation*, *206*, pp.181-189.

Calhoun, A.J., McGarry, M.A. and Reeve, A., 2003. Wetland connections: linking university researchers and high school teachers to advance science education and wetland conservation. *Journal of Geoscience Education*, *51*(4), pp.387-397.

Cannell, P., Macintyre, R. and Hewitt, L., 2015. Widening access and OER: developing new practice. *Widening Participation and Lifelong Learning*, *17*(1), pp.64-72.

Deegan, D., Wims, P. and Pettit, T., 2015. Practical Skills Training in Agricultural Education—A Comparison between Traditional and Blended Approaches. *The Journal of Agricultural Education and Extension*, pp.1-17.

Deepwell, M., Weller, M., Campbell, L. and Wilson, J., 2017. Open Education and OER-A guide and call to action for policy makers.

Dorrian, S. vk@ardgay.co.uk. Contractor work. 30th March 2019.

Education Scotland. (2015). *Collaborative Action Research (CAR).*Available: https://education.gov.scot/improvement/documents/sacfi12b-car-overview.pdf. Last accessed 23rd April 2019.

Education Scotland. (2010). *CfE Through Outdoor Learning*. Available: https://education.gov.scot/Documents/cfe-through-outdoor-learning.pdf . Last accessed 23rd April 2019.

Jentsch, B. and Shucksmith, M. eds., 2017. *Young people in rural areas of Europe*. Taylor & Francis.

John Muir Trust. (2019). *The John Muir Award Information Handbook*. . Available: https://www.johnmuirtrust.org/assets/000/001/552/Info_Handbook_with_weblinks_original.pdf?1456150239. Last accessed 23rd April 2019.

Loynes, C., 2018. Consider your trace: the shift from education 'in' to education 'for' the environment. In *The changing world of outdoor learning in Europe* (pp. 87-100). Routledge.

McGrath, S. and Powell, L., 2016. Skills for sustainable development: Transforming vocational education and training beyond 2015. *International Journal of Educational Development*, *50*, pp.12-19.

Oliver, C., Leader, S. and Kettridge, N., 2018. Birmingham Bog outdoor laboratory: potentials and possibilities for embedding field-based teaching within the undergraduate classroom. *Journal of Geography in Higher Education*, *42*(3), pp.442-459.

Papakitsos, E.C., Karakiozis, K. and Mavrakis, A., 2018. Towards Sustainable Development and Green Economy in European Union. *Journal of Economics and Management Sciences*, *1*(2), pp.p27-p27.

Ravenscroft, A. and Cook, J., 2007. New horizons in learning design. *Rethinking Pedagogy for a Digital Age*, pp. 207-218

Robson, C., 2011. Real world research (3rd Ed). *UK: Wiley*. Chichester.

Rutter, O., 2019. Power to the children. *Environment*, p.01.

Scottish Government, 2012. Scottish Government Urban/Rural Classification 2011 – 2012. https://www2.gov.scot/resource/0039/00399487.pdf *Scottish Government*. Accessed 14th March 2019

SDS, 2017. Jobs and Skills in Scotland – the evidence. https://www.skillsdevelopmentscotland.co.uk/media/43852/jobs-and-skills-in-scotland-2017-main-report.pdf *Skills Development Scotland*. Accessed 13th March 2019

Smyth, M.A., Taylor, E.S., Birnie, R.V., Artz, R.R.E., Dickie, I., Evans, C., Gray, A., Moxey, A., Prior, S., Littlewood, N. and Bonaventura, M., 2015. Developing Peatland Carbon Metrics and Financial Modelling to Inform the Pilot Phase UK Peatland Code. *Report to Defra for Project NR0165, Crichton Carbon Centre, Dumfries*.

SNH, a., 2014. Peatlands: A guide to educational activities for schools. *SNH, Stirling*. https://www.nature.scot/peatlands-guide-educational-activities-schools. Accessed 18th March 2019

SNH, 2014. Wild Land Area Descriptions. https://www.nature.scot/wild-land-area-descriptions. Accessed 14th March 2019

SQA, 2017. National Qualifications 2017 Internal Assessment Report Skills for Work: Rural Skills https://www.sqa.org.uk/sqa/files_ccc/2017IARSfWRuralSkills.pdf Accessed 1st April 2019

UNESCO, 2019.UNESCO Sustainable Development Goals. https://en.unesco.org/sdgs Accessed 2nd April 2019

Waylen, K.A., van de Noort, R. and Blackstock, K.L., 2016. Peatlands and cultural ecosystem services. *Peatland Restoration and Ecosystem Services. Science, Policy and Practice*, p.114.