



The James
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Institute

Scottish peat values and ecosystem services: Evidence Mapping Review protocol

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Amendments

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Support

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Introduction

Background

Protecting and enhancing soil health, particularly in peatlands given that they store nearly 50% of all Scotland's soil carbon, is key to reaching Scotland's net zero target by 2045. As the majority (>70%) of Scotland's approximately 2.4 million ha of peat is degraded, targeting the most cost-effective sites for restoration is necessary. Peatland restoration, however, does not just impact carbon, peatlands provide a range of ecosystem services, such as biodiversity, water filtration, and cultural landscapes. Understanding the range of values provided by peatlands, and how this may change with restoration, is therefore important for targeting restoration to ensure that these additional values are accounted for in assessing cost-effectiveness. Given the high profile of peatland restoration in Scotland and the increasing research into peat values and restoration the review will collate the existing research into an evidence map of use to policy and planners.

Stakeholder engagement

Proposal – Multiple rounds of feedback on proposed questions and methods from RESAS.

Identification of ecosystem services - Feedback from wider project researchers (peatland researchers from across disciplines).

Keyword development – Feedback from wider project researchers (peatland researchers from across disciplines). Key stakeholders including Peatland Action and RESAS.

Grey literature identification – Reports added by key stakeholders.

Data extraction – Feedback on data from key stakeholders including Peatland Action and RESAS.

Objectives

1. Identify which ecosystem services known to be provided by peatlands have been studied in Scottish peatlands, including:
 - a. Whether these include monetisation;
 - b. How these are impacted by restoration.
2. Identify which methods have been employed to value ecosystem services in Scottish peatlands.
3. Understand the strength of evidence for values of ecosystem services from peatland restoration and recognise gaps in our understanding.

Methods

Eligibility criteria

Criteria	Eligibility
Study design	Primary field based research, qualitative and quantitative studies included. Excluding reviews, opinion pieces, lab studies or research in which data is not used.
Setting	Scottish peatlands
Language	English
Publication status	Published and grey literature excluding pre-prints
Publication years	No limitation
Peatland definition	Area of peat soils in all conditions found within Scotland. Including bogs and fens on peat soils, but excluding other wetlands.

Ecosystem services definition	According to Common International Standard for Ecosystem Services (CICES) categories services provided by peatland ecosystems in three main categories (Bonn et al., 2016; Haines-Young & Potschin, 2012; Maes et al., 2014): provisioning; regulating and cultural services. Provisioning services include provision of nutrition, materials, and biomass supply. Regulating services consists of mediation of water, mass and wastes flows and maintaining biodiversity and climatic balance. Cultural services entail physical, intellectual, and spiritual benefits derived the peatlands. Specific services were not searched and instead generic terms including though for value and finance to reduce number of irrelevant papers.
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Information sources

Database	Rationale
Web of Science	Covering range of academic literature
Websites of Scottish peatland managers (NatureScot, RSPB, Peatland Action, National Trust, Game and Wildlife Conservation Trust, Forest Research, Scottish Forestry, Woodland Trust, Scottish Wildlife Trust)	Grey literature
Website of Scottish Government	Government funded literature and relevant policy
Climate Exchange website	CXC funded reports – including reference lists to capture further grey literature
Reference lists of reviews	Expand published literature and ensure all published literature captured

Search strategy

Key concept	Potential keyword
Peat	Peat* OR bog OR fen OR histosol OR “organic soil” OR *moor* OR “muir*” OR “rush” OR “reed*”
Ecosystem service	“ecosystem service” OR “ecosystem benefit” OR “natural capital” OR “regulating service” OR “provisioning service” OR “cultural service” OR “supporting service” OR valu* OR econom* OR financ*
Scotland	Scotland OR UK

Index for Web of Science

TS = (Peat* OR bog OR fen OR histosol OR “organic soil” OR *moor* OR “muir*” OR “rush” OR “reed*”) AND (“ecosystem service” OR “ecosystem benefit” OR “natural capital” OR “regulating service” OR “provisioning service” OR “cultural service” OR “supporting service” OR valu* OR econom* OR financ*) AND (Scotland OR UK)

The search will be considered complete when no new articles are found through reference lists or through stakeholder consultation.

Study records

Data management

Papers will be stored in shared OneDrive folder by first author name followed by date. If multiple papers with the same first author name and date they will be given letters following the alphabet (e.g. Smith2010a, Smith2010b). This will form the paper ID code.

Data will be extracted into Excel datasheets, linked to papers by paper ID code. All entries will include initials of person adding data to the sheet.

Selection process

Title screening

Following searches records will be combined and duplicates removed. Titles will then be screened based on eligibility criteria. Titles will be excluded if they:

- Do not include peatlands
- Include only peatlands outside of Scotland
- Are not concerned with delivery of ecosystem service
- Are review or opinion pieces
- Are lab based studies
- Are in a language other than English

If there is any ambiguity papers will be retained to abstract screening.

Abstract screening

Abstracts will be screened according to eligibility criteria as above. Retained papers will also be classified according to the types of ecosystem services considered (provisioning, regulating, cultural, supporting).

Full text screening

Full text will be screened at the same time as data extracted according to eligibility criteria detailed above.

At all stages 10% of papers will be screened by both researchers and Kappa statistic used to determine agreement in retaining/excluding papers. Where disagreement is high papers will be reconsidered and discussed until agreement between researchers is reached. The reason for paper exclusion will be recorded in each instance.

Data collection process

Data will be extracted following abstract screening into Excel sheet. The sheet will be piloted with 10 of the same records by each researcher to allow adaptations as needed and to check consistency in data extracted.

Where data is not available from literature the corresponding author will be contacted. If data cannot be obtained it will be considered “not available” and therefore not counted towards the strength of evidence.

Data items

Article metadata

Title

Author

Year

Publication

Study context

Location – Scotland only or UK/Europe/Global (inc Scotland)

Exact location in Scotland

Number of sites

Total area of sites

Start year data collection

End year data collection

Duration data collection (months)

Ecosystem services

Provisioning services – Y/N

Regulating services – Y/N

Cultural services – Y/N

Supporting services – Y/N

List services studied

Restoration – Y/N

Restoration type -

Valuation

Monetised – Y/N

Valuation methods – List

Number of responses

Respondents considered representative – Y/N

Details of representativeness of respondents

Results

Extent of ecosystem services provision – summary of extent of services as described in paper

Value of ecosystem services provision – summary of valuation of services as described in paper

Monetary value (£/ha) – multiple lines may be needed

Value confidence interval

Confidence in evidence

Study design – Randomised control trial; Before and After (with control); Case study

Methods – As described in paper

Outcomes and prioritisation

Monetary and non-monetary valuation outcomes will be considered equal. Outcomes will be prioritised according to:

- Number of sites considered
- Area of sites considered
- Number of respondents (where applicable)
- Period of time data collected

Risk of bias

Risk of bias will be considered from ‘low’, ‘medium’ and ‘high’. Initially studies with control site will be expected to have low risk of bias, and those without high risk of bias. Studies may move up or down risk according to:

- Missing data – either in time or between sites
- Small sample sizes in valuation
- Non-representative samples in valuation
- Single sites
- Small sites

Justification will be provided for risk of bias choice.

Data synthesis, knowledge gap and confidence in evidence

Based on Bonn et al 2016 assessment of peatland ecosystem services, data will be summarised by ecosystem services type, and then by monetary and non-monetary values.

Confidence in evidence will be determined based on:

- Agreement of evidence between multiple sites – higher confidence where more, disparate, sites are considered
- Agreement of evidence between multiple studies
- Risk of bias considered low

Gaps will be identified where data is missing, contradictory, has high risk of bias, or low confidence in evidence.

Gantt Chart

	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Protocol												
Develop search string - academic												
Search grey literature												
Screen titles												
Design database												
Screen abstracts												
Extract data												
Evidence map finalised including report												