Assessing the impact of forestry on water quality in Scotland: A review of modelling capabilities

Section 1: Project Overview

Introduction

The Centre of Expertise for Waters (CREW) intends to commission a **capacity building project** aligned with CREW's **Water Quality and Health** thematic area that improves understanding of the risks to water quality from forestry.

Background and knowledge gap

It is thought that forestry, either due to historic practices, current high-risk practices or current non-compliance with Forest and Water Guidelines, is potentially impacting some waterbodies, protected habitats, and/or drinking water supplies that are currently degraded or at risk.

Forestry audits carried out by SEPA have identified ongoing historic issues (e.g., drainage direct to watercourses) or current issues which suggest that the risk from commercial forestry (primarily conifers) may be greater than expected. However, there is currently no objective way to assess the significance of these risks in relation to other threats to water quality within a catchment or to assess future risks. This makes it difficult to identify significant pressures with confidence and justify the measures which are needed to restore or protect these waterbodies and protected areas. Previous identification of forestry pressures on these downgraded waterbodies has largely been judgement based, relying on the experience and expertise of staff which varies between regions.

Assembling a **set of the most common modelling scenarios** is envisaged to support the development of an objective, modelling-based source apportionment assessment. This will reduce potential regional bias and enable forestry pressures and measures to be identified where needed across Scotland. SAGIS, the source apportionment assessment tool currently used by SEPA, does not include forestry. Ongoing work to redevelop SAGIS will include forestry, however SEPA will need to evaluate **which contributing models** are most suitable to provide information to SAGIS, and their associated uncertainty.

Reviewing the capability of current models to adequately include identified risk factors, and/or to identify gaps for future model development is required to improve the understanding of the contribution from forestry to currently downgraded waterbodies/habitats or highlight the potential risk though non-compliance or particular practices.

Aim and key objectives

The overall aim of this project is to review 1) the current and potential risks[1] to water quality from commercial forestry operations[2] and 2) the suitability of available models to assess these risks[3]. The project also aims to assess the ability of the available models, if/when included in SAGIS[4], to indicate the relative contribution from forestry compared to other land uses and point sources. Ultimately, these modelling scenario findings used in SAGIS will help target compliance audits and implementation of adequate control measures or practices to the highest risk areas.

In support of this aim, this project will:

- Work with stakeholders (see stakeholder list in Intended Impacts, pg.3) to collate the experiences and evidence of those that have witnessed and documented forestry practices which are thought to be high risk.
- Work with catchment modelling experts to identify commonly occurring high risk factors from forestry, confirm the level of importance and assess/quantify their effect on pollution potential under differing environmental conditions (e.g., soil type, slope, rainfall, existing buffer).
- Review the capability of current models to adequately include these risk factors. If appropriate, identify gaps for future model development.
- Develop a set of the most common catchment modelling scenarios, based on observed practices and known risks gleaned through regulatory experience (historic and present).

The **key questions** to be addressed are:

1. Which pollutants are of most concern?
2. What types of water bodies and associated habitats are most susceptible to deterioration from forestry pressures (e.g., increased or reduced flow)?
3. Can we identify the most common risk factors?
4. Are the data available to understand the spatial distribution of these risk factors?
5. How can the pollutant loss associated with these risk factors be estimated? Are there sufficient data / literature /expert judgement?
6. Can we develop a range of risk scenarios for forestry similar to the SAGIS scenarios for agriculture?
7. Are there models already available which could model these risk scenarios?
8. If necessary, which model developments would be needed to model forestry accurately?

[1] Risks to the following Receptors should be considered: RBMP: Classified baseline waterbody, Protected Habitat (e.g., SAC, SPA, SSSI), and Drinking Water supplies.
[2] Non-commercial forestry is considered to be low risk and lower priority.
[3] This project is limited to a review of model needs and availability and does not include model development.
[4] Source Apportionment Catchment Modelling tool (https://sagis.ukwir.org/sagis/welcome)

Intended impacts

There are multiple pathways for a project to achieve impact, and multiple factors that can impact the project's ability to achieve what it intends to do; both along the project lifecycle (A.IMPACT) and beyond project completion (B.IMPACT) (Figure 1).

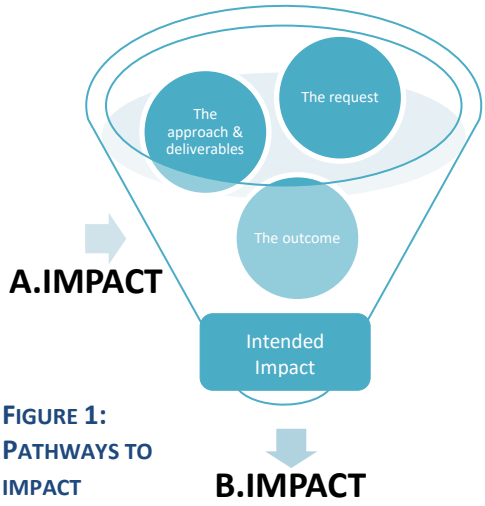

FIGURE 1: PATHWAYS TO IMPACT

- **The request**: the problem/ gap that has been identified that drives the project.
- **The approach & deliverables:** the 'methods' that explain how the request is being answered and the 'outputs' that are tangible products delivered by the project.
- **The outcome:** this is directly correlated to the findings; this is short to mid-term change because of the research.
- **Intended impact:** Explicitly what this project intends to achieve to address, which is connected to the request.
- **Along impact**: the conditions and causal factors that can influence the project during its life cycle.
- **Beyond impact:** more significant wider change that occurs at a longer timescale following the project's completion.

Along Impact *(A.Impact)*:

These stakeholders are anticipated to be a key influence on this project:

- SEPA
- NatureScot
- Rivers and Fisheries Trusts of Scotland (also known as the Association of Scottish River & Fishery Management)
- Scottish Water
- Fishery boards (e.g., Spey Fishery Board)
- Forestry Scotland
- Scottish Forestry
- Forestry and Land Scotland
- Forest Research
- Industry

Beyond Impact *(B.Impact)*:

Beyond the project, the project deliverables (see following section) will be used to:

- Allocate SEPA compliance resources most efficiently;
- Bring to Industry's attention any findings highlighting increased risk that could be considered for good practice guidance. Improved guidance on felling and particularly restocking could be beneficial.
- Help direct tree planting to the right place in support of the woodland creation targets contained within Scotland's forestry strategy (Scotland's Forestry Strategy 2019–2029 - gov.scot (www.gov.scot);
- Support implementation of SEPA's River Basin Management Plan commitments to identify pressures and measures for downgraded waterbodies and habitats. Further details are available in the online plan: RBMP3 (sepa.org.uk).

Deliverables

- Communications and intended impact approach – supported by CREW at project start
- Workshop report documenting modelling scenarios, issues, and risk factors
    - Cover image(s) with associated photo credits
- A final report of 20-30 pages, excluding annexes and the bibliography, and including:
    - A review of water quality/catchment risk factors from forestry operations and capabilities of current models to assess these factors under differing environmental conditions;
    - A review of the capability of current models to adequately include these risk factors. If appropriate, identify gaps for future model development;
    - A set of most common catchment modelling scenarios (see aim and key objectives);
    - A concise set of recommendations;
    - Cover image(s) with associated photo credits.
- Infographics to support main report
- A plain English summary of aims and results and recommendations (up to 1 page)
- Website summary (200 words)

Events/meetings

- Project Steering Group meetings (throughout the project lifecycle)[5] *(3 meetings, 2 in-person and 1 online)*
- Engagement with relevant stakeholders (by interview, email, workshop as appropriate) to collect evidence of current practice and potentially high-risk activities.
- One Stakeholder-engagement workshop
- One Dissemination workshop presenting project results

[5] Please note, CREW requests a brief written update c. two weeks prior to project steering group meetings.

Section 2: Further information for applicants

Project management

Day-to-day communication will be between the research/review team (the contractor) and a CREW Project Manager and is likely to involve short catchups as agreed.

Project steering group

A small group including representatives of Scottish Government and its delivery partners plus a CREW representative, will meet with the preferred bidder for a pre-contract meeting and provide feedback on the bidder's proposed approach.

Anticipated timescale

A pre-contract meeting will take place approximately **wb. 30th October 2023**. The project will commence by **mid-end November 2023** with the project outputs signed off by the CREW Director by **May 2024.**

Funding

The maximum amount of funding available exclusive of VAT (where applicable) is **£95,000**

This includes an associated costs (excluding sub-contractor) budget of:

- £1,000 for meeting room and equipment hire for two in person project steering group meetings
- £1,800 for meeting room and equipment hire for two workshop/dissemination events
- £1,500 for travel and subsistence

Submitting a proposal

Please complete a CREW application form addressing the project requirements.

A copy of expectations and the award criteria are provided below for reference.

Proposals need to be submitted procurement@crew.ac.uk for evaluation **by Monday 2nd October, 15:00.** We aim to notify the successful bidder by **23rd October**.

Please contact procurement@crew.ac.uk by **Monday 25th September** if you would like any clarification on any of the above. You should highlight any potential conflicts of interest in your proposal. For queries about what may constitute a potential conflict of interest please contact the CREW Deputy Manager (Nikki.Dodd@hutton.ac.uk).

Expectations

No.	Criteria	Descriptor
1	Duration	The proposed duration will align closely to the details provided in the anticipated timescales section of the specification.
2	Staff time and effort	The proposed allocation of staff time and effort is appropriate and includes all deliverables. The proposal must also provide a commitment that named staff members will be available to work on the contract if the bid is successful. For any unnamed staff, appropriate risk identification and mitigation measures are provided.
3	Project costs	The estimated breakdown of project costs is realistic and inclusive of all deliverables.

Award criteria

No.	Criteria	Descriptor
1	Understanding the project ask and policy background	The proposal should include an introduction which demonstrates a clear understanding of the project requirements. This should include an understanding of the policy background and the supporting role of this project; the need for this research; the project aim; and how the proposal will address this aim.
2	Proposed methodology	The proposal should demonstrate a high quality and workable methodology, including how the evidence will be identified, reviewed and assessed; consulting relevant stakeholders and/or experts where appropriate to address the key questions and produce the deliverables in the timescales required. It should explain the suitability, robustness, and limitations of the proposed methodology.
3	Milestones	The project milestones are logical, practical and include all deliverables.
4	Project Management	The staff, resources and expertise are appropriate for conducting the proposed project. The proposal should name the project lead and outline their project management experience.
5	General and specific topic expertise and experience	The proposal should provide details of individual staff members who will work on this project and demonstrate how they will meet the project requirements, specifically: - general research experience and expertise; - specific experience and expertise on the topic of modelling forestry water quality impacts.
6	General communication and deliverables	The proposal should describe the approach to producing the deliverables, which will be published on the CREW website. It should detail who will take lead responsibility for report-writing and overall report quality. It should provide examples of previously published (modelling forestry impacts on water quality) in which they have been involved.
7	Quality assurance	The proposal should provide details of quality assurance procedures to demonstrate how the contract will be continuously delivered to a high standard. It should specifically address issues of quality control at different stages of the project, including evidence gathering, analysis and report writing. It should include a timetable for delivery of tasks, project milestones and allocation of staff and staff time against each task, covering the duration of the contract.
8	Risk	The proposal should provide a risk assessment matrix detailing any risks identified in relation to the delivery of this contract, and proposed mitigation measures to minimise their probability and impact, focused particularly on risk to completion on time.

Annex A. Relevant reports, studies, and policies

- The PLUS+ modelling approach has been used within SEPA and is subject to uncertainty associated with identifying most significant pressures using a high-level modelling tool. The General methodology for is available here: PLUS+ User Manual (hutton.ac.uk)
- Reducing pollution from forestry related activities in the Galloway and Eskdalemuir forests: A review of Best Management Practices to reduce diffuse pollution | CREW | Scotland's Centre of Expertise for Waters