# Brashly Improving Water Quality

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## Introduction

Brash is the waste left over from harvesting trees, i.e., the tops of trees, branches, and foliage. While commonly left on site to provide fertiliser for the next generation of trees, brash has also been shown to export dissolved organic carbon, phosphorous, and nitrogen to freshwater environments [1]. This export creates diffuse pollution and can have negative effects on the environment and water supplies, e.g., potentially causing eutrophication and oxygen loss in water bodies [2].

While brash can be removed and sold (as a low value, secondary product), it is not always economically viable to do this, particularly from peatland restoration sites as it's often dirty, bulky and has to travel long distances to process. Therefore, brash can either be managed onsite to reduce the risk of diffuse pollution, or, removed from site and turned into a higher value product.

## Aims of PhD

- Determine the mechanisms underlying the effects of brash management on water quality.
- Investigate physico-chemical properties of brash biochar – with a view to improving water quality.
- Assess rapidly evolving felling and peatland restoration techniques.
- Evaluate the cost effectiveness of utilizing biochar from waste brash as a potential water treatment tool.

## Water quality and brash management for peatland restoration

The research site is Benmore Forest, Sutherland. Through Forestry and Land Scotland's land management plan, large areas of afforested commercial conifer plantation are undergoing peatland restoration.

- 3 felling methods are being investigated (n = 2 sites for each):
  - Conventional felling
  - Felling multiple drifts of trees into one
  - Mulching standing trees
- Ground smoothing will then take place.

Water samples will be taken (to assess how different brash management impacts water quality) alongside water table depth measurements (to measure water table recovery and therefore peatland restoration quality) every 4 weeks.


## Brash biochar as a water filter?

- Assess brash biochar's pollutant adsorption capacity and its potential for leaching unwanted chemical components.
- Efficiency test in a mesocosm set up first.
- If of potential benefit, field trials will be implemented.



**Brash mat.**



**Brash biochar.**

## Mesocosm design - What are your thoughts?

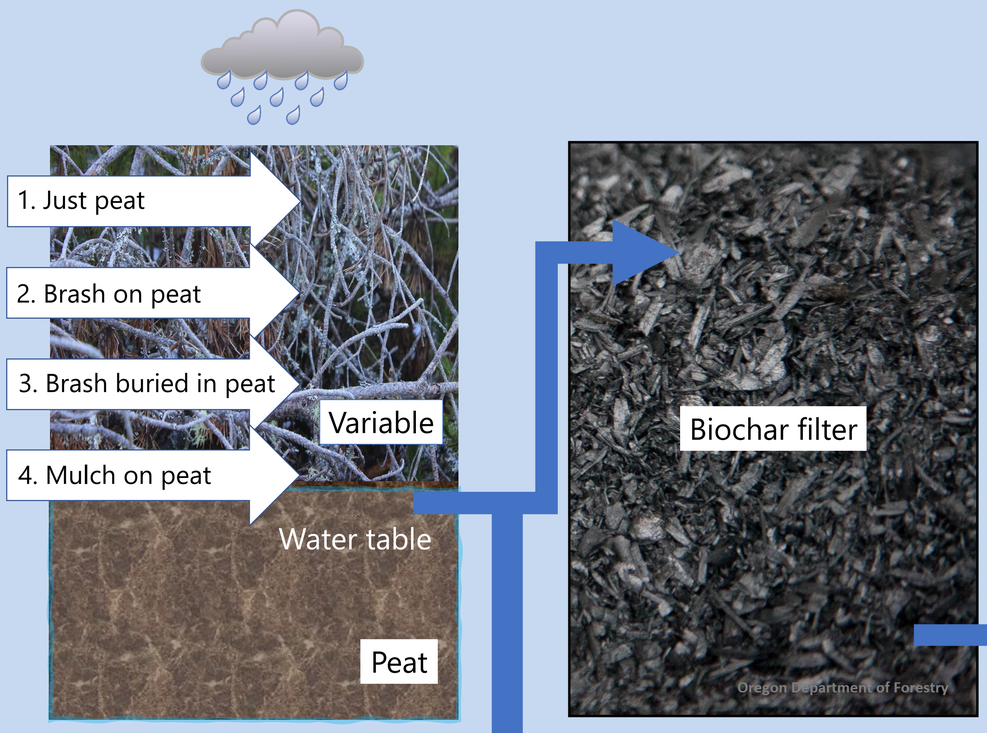
This is our proposed mesocosm design. Please take a post-it-note and give us your feedback to help improve the design.

**Aim of mesocosm:**

- Allow pre- and post-biochar filter treatment samples.
- Simulate surface runoff, not pore water.

**Variables to test:**

1. No brash (peat alone)
2. Brash on peat
3. Brash buried in peat (ground smoothing)
4. Mulch on peat




## Next steps...

- Consider scaled up filter design for field tests.
- Consider cost-benefit of using a brash biochar filter.
- Continue NVC survey to monitor vegetation regeneration.

**References**

[1] Asam *et al.* (2014) *Ecological Engineering*, 64, pp. 161–170.
[2] Dodds, W.K. and Smith, V.H. (2016) *Inland Waters*, 6(2), pp. 155–164.

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