



Preserving carbon in Welsh peatlands

Why are peatlands in Wales important?

There are over 70,000 hectares of peatlands in Wales. The vast majority is as upland blanket peat bog but there are also a few hundred hectares of natural peatland in the lowlands. Globally, peatlands are an important carbon store representing about 60 % of the world terrestrial carbon despite covering less than 3 % of the total land area. When actively forming, peatlands can sequester carbon but in degraded peatlands carbon dioxide, CO₂, and other important greenhouse gases can be released. So peatlands have a massive potential influence on climate change. They can also provide valuable ecosystem services such as flood risk alleviation, clean drinking water and are important natural habitats protected for their biodiversity under EU and UK legislation. As such, maintaining and preserving peatland in Wales is a Welsh Government priority.

How has past land use affected Welsh peatland?

Historically, open drainage channels were dug through large areas of upland peat bogs in Wales with the aim to drain the land so that it might be more suitable for livestock farming or forestry plantation. This common management practice of the past has tended to lead to the degradation of the peatland and the release of CO₂ to the atmosphere.

Drainage lowers the water table so that the peatland might no longer be water logged and so the peat can dry out. Under these conditions the peat can become more unstable; it can start losing carbon as carbon dioxide emissions and can suffer wind and water erosion whereby more carbon is lost. There can also be an increase in the amount of nitrate lost from the peatland which can have a negative impact on the ecology of the surrounding water courses. A high concentration of nitrate in water courses is undesirable as nitrate decomposition is associated with the production of the potent greenhouse gas nitrous oxide, N₂O.

Drier conditions can change the unique habitat characteristics of the blanket bog causing a loss of peatland biodiversity as well as making the peat being more susceptible to loss by fire, even under controlled burning. Furthermore, drainage channels can lower the water holding capacity and increase the speed of surface water run-off after rainfall and so the flood alleviation function of the peatland may be reduced.

Can blocking of drainage channels preserve Welsh peatlands?

Recently, in response to the negative environmental impacts associated with peatland degradation, drainage channels in many blanket bogs in Wales have been blocked. In an attempt to re-wet the peatland, physical barriers are constructed to dam the drainage channels so that water is held back resulting in the water table being raised. There are a few different effective techniques used by land managers to construct drainage dams including using wooden boards or bales of cut vegetation such as bracken or heather. The aim is to

reinstate more waterlogged conditions and in doing so potentially restore or prevent further degradation of the peatland.

Studies have shown that drain blocking is generally effective at preserving peatland. A short term gain can be a decrease in dissolved organic carbon and brown colouration in the drainage water. This can represent an improvement in the carbon storage potential of the peatland. The lower carbon content in the run-off water is also desirable in terms of water quality. In the longer term, peatland soil structure can improve by drain blocking and the carbon dioxide and nitrate losses can decrease. Drain blocking seems to increase the cover of peat-forming vegetation which can lead to renewed carbon storage and maintenance of a good blanket bog habit, although this is not so on every site and more studies are needed to establish why this is the case.

One potential problem of re-wetting the peatland is that in the short term there may be an increase in emissions of methane, CH₄, a powerful greenhouse gas. However, in the long term, this may be compensated for by the decreased carbon dioxide emissions and increased carbon accumulation, but more long-term studies are needed as this remains uncertain.



Figure 1: Erosion and loss of soil carbon from Welsh peatlands



Figure 2: Blocking of drainage ditches in Welsh peatlands prevents erosion and restores biodiversity and restores carbon storage.