

Engineers find optimum solution to protect aquatic biodiversity by forested areas

April 18 2014, by Thomas Deane

Environmental engineers from Trinity College Dublin have devised a sustainable approach to mitigate the environmental impacts that peatland forestry practices exert on Ireland's precious aquatic biodiversity. By seeding grasses next to timber plantations, they showed that things really could be greener on the other side of these 'buffer zones'.

Peatland forestry is a common means of producing timber in Ireland, but the areas in which it takes place contain the headwaters of rivers with naturally low levels of nutrients. The rivers are key biodiversity refuges, containing commercially and ecologically important species threatened by extinction according to IUCN's Red List. European eels, freshwater pearl mussels, and Atlantic salmon, which are protected under Annex II and V of the European Habitats Directive, are all found in these ecosystems.

Peatland was converted to coniferous forest plantations during the late 20th century in much of north-western Europe, Scandinavia, the former USSR, and North America, as people were driven by the need to unlock a valuable natural resource in the form of timber. By the end of 2000, about 300,000 hectares of blanket peat had been 'afforested' in this way in Ireland. Disturbingly, many studies have documented the negative impacts of peatland forestry on [water quality](#) and ecology, bringing into question the associated economic viability and environmental ethics. Many of these forests are now reaching harvestable age, which presents an environmental problem that must be solved.

The environmental engineers at Trinity might well have found that solution, as they now know that seeding grasses in '[buffer zones](#)' located near forested peatland areas helps to reduce concentrations of suspended solids and phosphorus in nearby water systems. The grass-seeded buffer zones function by retaining some of the nutrients released when trees are harvested, and which would otherwise make their way into streams and rivers at levels that harm water quality, ecology, and associated biodiversity.

Assistant Professor in Civil, Structural and Environmental Engineering at Trinity, Dr Liwen Xiao, published research in the journal *Ecological Engineering* that confirmed buffer zones themselves had some value in protecting biodiversity. He said: "Everybody had been talking about buffer zones as a way of protecting threatened fish and freshwater pearl mussels. However, before our study, there was very little data available in Ireland to substantiate the claims."

Despite their encouraging results, buffer zones alone were relatively inefficient nutrient removers, which drove the engineers to seek a superior solution. To stop the nutrients leaving the buffer zones, Dr Xiao and his team seeded grasses native to Ireland immediately after timber was harvested in the Burrishoole Catchment area, Co. Mayo – one of the most important European eel and Atlantic salmon research catchments in the world.

As hoped, the team found that these seeded grasses acted as ecological guardians by 'soaking up' the troublesome nutrients. The results of this study have just been published in the journal *Forest Ecology and Management*.

Dr Xiao added: "This new approach is sustainable and has a great advantage over traditional mitigation methods. It will not only reduce the nutrient concentrations in the receiving waters, but also make these

nutrients available for subsequent forest rotations. I hope the findings will stimulate further research in similar ecosystems and believe that this method might represent the optimum solution to protecting aquatic biodiversity and commercially important species in forested areas."

More information: Connie O'Driscoll, Mark O'Connor, Zaki-ul-Zaman Asam, Elvira de Eyto, Russell Poole, Michael Rodgers, Xinmin Zhan, Mika Nieminen, Liwen Xiao, "Whole-tree harvesting and grass seeding as potential mitigation methods for phosphorus export in peatland catchments," *Forest Ecology and Management*, Volume 319, 1 May 2014, Pages 176-185, ISSN 0378-1127, [dx.doi.org/10.1016/j.foreco.2014.02.011](https://doi.org/10.1016/j.foreco.2014.02.011).

Connie O'Driscoll, Mark O'Connor, Zaki-ul-Zaman Asam, Elvira de Eyto, Michael Rodgers, Liwen Xiao, "Creation and functioning of a buffer zone in a blanket peat forested catchment," *Ecological Engineering*, Volume 62, January 2014, Pages 83-92, ISSN 0925-8574, [dx.doi.org/10.1016/j.ecoleng.2013.10.029](https://doi.org/10.1016/j.ecoleng.2013.10.029).

Provided by Trinity College Dublin

Citation: Engineers find optimum solution to protect aquatic biodiversity by forested areas (2014, April 18) retrieved 16 August 2024 from <https://phys.org/news/2014-04-optimum-solution-aquatic-biodiversity-forested.html>

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