



<b>Title</b>	Water quality dynamics of an extracted peatland and pond treatment
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<b>Publication date</b>	2023-04-28
<b>Publication information</b>	Mendes, Lipe Renato Dantas, and Florence Renou-Wilson. "Water Quality Dynamics of an Extracted Peatland and Pond Treatment," April 28, 2023. <a href="https://doi.org/10.5194/egusphere-egu23-3563">https://doi.org/10.5194/egusphere-egu23-3563</a> .
<b>Conference details</b>	The European Geosciences Union (EGU) General Assembly 2023, Vienna, Austria, 24–28 Apr 2023
<b>Item record/more information</b>	<a href="http://hdl.handle.net/10197/27130">http://hdl.handle.net/10197/27130</a>
<b>Publisher's version (DOI)</b>	<a href="https://doi.org/10.5194/egusphere-egu23-3563">10.5194/egusphere-egu23-3563</a>

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EGU23-3563

EGU General Assembly 2023

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## Water quality dynamics of an extracted peatland and pond treatment

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Peatlands comprise a significant share of the land surface in Ireland, i.e. 21%. Degradation of these ecosystems for horticultural industry purposes has exerted pressure on the water quality of surface waters. This occurs due to the removal of hydrophytic vegetation, drainage and exposure of the peat to aerobic conditions, in which the latter disturb the local water regime and accelerate decomposition processes. This subsequently results in significant leaching of carbon and nitrogen compounds such as dissolved organic carbon and ammonia. Despite the above, little study has focused on understanding the effects of peatland degradation on the waters leaving such catchments and therefore adequate mitigation measures.

We hypothesize that the water quality of effluents from such extracted peatlands is highly dynamic, and these effluents are harmful to surface waters all year round. Here we compare the results with environmental thresholds and studies testing the effect of effluents in surface waters. We hypothesize that prolonging the hydraulic residence time of the effluents in situ does not suffice for treatment due to high proportion of soluble nutrients and lack of necessary biogeochemical conditions.

The results presented here are based on long-term monitoring (c. 2 years to date) of an extracted degraded Irish raised bog (53°41'54.9"N 7°24'53.7"W). The site was drained for the extraction of horticultural peat. The drainage network allowed the water to flow into a pond for water treatment including particle sedimentation. Hereby, nutrient discharge from the site to surface waters downstream was expected to be minimised. A YSI EXO2 Multiparameter Sonde installed at the outlet and then at the inlet of the pond allowed continuous (up to 30-min interval) measurements of temperature, pH, conductivity, turbidity, fluorescent dissolved organic matter and ammonium concentration during most of the monitoring period. An area velocity flow meter paired with the Sonde allowed continuous (5-min interval) measurements of flow rate. In addition, a Teledyne ISCO Sampler 6712 installed at the pond outlet ensured time-proportional samplings during 11 storm events to date, i.e. when the pond water level exceeded a threshold. Finally, grab samplings have been periodically conducted at the pond inlet and outlet during the monitoring period. These samplings have been analysed for a series of water quality parameters including carbon, nitrogen, phosphorus and ionic compounds.

Analyses of the data carried out to date corroborate the hypotheses. This includes acidic discharges, and variable and significant outflow concentrations of nutrients in different seasons, as well as minimal treatment in the pond. This subsequently highlights the need of proper

mitigation measures in degraded peatland catchments in order to regulate the water quality of the effluents and ensure good ecological status of surface waters downstream.