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Restoring peatlands to carbon sinks

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Regulation of greenhouse gases by upland peat is important on an international scale, therefore it is necessary to establish whether peatlands are a sink or source of greenhouse gases. As peatlands have been degraded over time by both anthropogenic and environmental influences, the question is not whether degraded peatlands are a source of carbon but of how much? The next question is what can be done to reduce these carbon emissions, and restore peatlands to their historic sinks of carbon? This study shows how peatlands, degraded by pollution and wildfire, are a source of carbon and how different restoration techniques, such as geojute netting, seeding and liming, can affect the carbon fluxes. Net carbon budget values range from a carbon source of 58.2 TC km-2a-1 to 269.7 TC km-2a-1. Respiration measurements vary from 77.0 TC km-2a-1 to 402 TC km-2a-1, whilst primary productivity measurements vary from -3.1 TC km-2a-1 to -212.6 TC km-2a-1. This study shows which restoration techniques are successful at reducing these carbon emissions by promoting vegetation and decreasing depth to the water table with geojute netting being the most successful at increasing primary productivity with a primary productivity value of over 100 TC km-2a-1 greater than the control site. Another measure of restoration success is percentage cover of plants with cover ranging from 100% bare peat to a composition of grasses and sedges. This study will also comment on the soil microbe community by interpreting values of CO_2 production corrected for soil temperature and water table depth introducing the concept of dead peat with R10 values between 0.0077 and 0.225 where R10 values for recovering peat are higher that the control site (0.178) suggesting greater microbial activity, and poor microbe activity, R10 values much lower than the control site, being indicative of dead peat . The greatest change of water table depth for all the sites is 79.4 cm with the smallest change in water table depth was

50.65 cm this is significant in relation to carbon fluxes. From soil water chemistry, it can be seen that the greatest E4/E6 ratio is 12.9 from a seeded and limed site, whilst the most humified sample is from the control site with a value of 7.1. The pH values for all the sites rage between 3.8 and 5.75.