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Examining Microbial Decomposition, Carbon Cycling and Storage in Cefni Coastal Salt Marsh, Anglesey Island, Wales, United Kingdom

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Abstract : Salt marshes are known to sequester carbon dioxide from the atmosphere into the soil, but natural and anthropogenic activities could trigger the release of large quantities of centuries of buried carbon dioxide, methane and nitrous oxide (CO2, CH4 and N2O) which are the major greenhouse gases (GHGs) implicated with climate change. Therefore, this study investigated the biogeochemical activities by collecting soil samples from low, mid and high zones of the Cefni salt marsh, within the Maltreat estuary, on the island of Anglesey, north Wales, United Kingdom for a consortium of laboratory based experiments using standard operating protocols (POS) to quantify the soil organic matter contents and the rate of microbial decomposition and carbon storage at the Carbon Capture Laboratory of Bangor University Wales. Results of investigations reveals that the mid zone had 56.23% and 9.98% of soil water and soil organic matter (SOM) contents respectively higher than the low and high zones. Phenol oxidase activity (1193.53µmol dicq g-1 h-1) was highest at the low zone in comparison to the high and mid zones (867.60 and 608.74 µmol dicq g-1 h-1) respectively. Soil phenolic concentration was found to be highest in the mid zone (53.25 µg-1 g-1) when compared with those from the high (15.66 µg-1 g-1) and low (4.18 µg-1 g-1) zones respectively. Activities of hydrolase enzymes showed similar trend for the high and low zones and much lower activities in the mid zone. CO2 flux from the mid zone (6.79 ug g-1 h-1) was significantly greater than those from high (-2.29 ug g-1 h-1) and low (1.30 µg g-1 h-1) zones. Since salt marshes provide essential ecosystem services, their degradation or alteration in whatever form could compromise such ecosystem services and could convert them from net sinks into net sources with consequential effects to the global environment.

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