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Wetlands: an imbroglio of interlinked carbon pools

AFREEN J. LOLU^{1*}, AMRIK S. AHLUWALIA¹, MALKIAT C. SIDHU², ZAFAR A. RESHI², MANZOOR A. SHAH² & SAMI J. LOLU³

¹Department of Botany, Panjab University, Chandigarh, 160014 ²Department of Botany, University of Kashmir, Srinagar, J & K, 190006 ³Department of Electrical Engineering, IUST, Awantipora, J & K, 192122

Abstract: Wetlands are considered as the largest terrestrial carbon sinks, when comparing their carbon sequestration capacity on a longer time scale. Most of the work on wetlands has been done on their carbon sequestration potential but their internal carbon pools have not received much attention. Wetlands are an interlinked complex of different carbon pools which play a significant role in maintaining and enhancing their total carbon sink capacity. This review highlights various carbon pools of wetlands and their individual capacity of sequestering carbon. Among these pools, macrophytes are the most important ones which have largely been neglected because of their relatively smaller pool size. They are the manufacturers of all the organic carbon (allochthonous or autochthonous) to the wetlands. They represent huge aboveand below-ground biomass which acts as a substratum to various other micro-organisms (periphyton) resulting in the retention of additional organic matter in the wetland ecosystems. This standing biomass keeps on adding its stored carbon content to the wetland soil in the form of detritus as it senesces. Macrophytes are also responsible for prevailing aerobic conditions in the rhizosphere and suppressing methanogenesis through their below-ground components which most of the studies have not included. Ignoring such a significant pool shall result in a huge difference in the figures of total wetland pool size. This review summarizes how macrophytes are important in enhancing carbon sink capacity of wetlands. It also signifies the connection between wetlands and climate change and the severe impact of increasing temperatures on the ecosystem services provided by the wetlands.

Key words: Allochthonous, autochthonous, climate change, carbon sequestration, methanogenesis.

Introduction

Wetlands are the most productive ecosystems on this planet (Ghermandi *et al.* 2008). They are considered as the ecotones between terrestrial and aquatic ecosystems, characterized by water table at or near the surface or are covered by shallow waters entirely (Mitsch & Gosselink 1986). Except Antarctica, wetlands are distributed in all the climatic zones ranging from tropics to tundra. Of the total Earth's surface, these cover approximately 6% and comprise about 3% of tropical and subtropical Asia (Junk *et al.* 2013). India has approximately 7.57 lakh wetlands spreading over an area of more than 15 million hectares, contributing about 4.7% of the total geographical area of the country. Of this total area, 69% is under inland wetlands, 27% under coastal wetlands

*Corresponding Author, e-mail: aafreenloolu@yahoo.com