Abstract
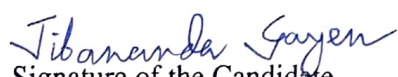
Title: *Changing Ecosystem Health of Wetlands of Ichhamati Floodplains in North 24 Parganas, West Bengal*

Along with biological productivity, wetlands of Ichhamati floodplains, North 24 Parganas, West Bengal also contribute substantially towards livelihood provisioning of millions. Subsistence-based faming and traditional fishing activities are intensively practiced in these wetlands. Therefore, exploitative anthropogenic activities have resulted into continuous fragmentation and degradation of these landscape units thereby deteriorating their ecological health throughout the region. Consequently, water quality deterioration, biodiversity loss, and diminishing ecosystem services are some persistent issues generally observed in the wetlands owing to aquatic pollution, landscape fragmentation, and microclimatic changes. Hence, assessment of wetland ecological health is crucial and necessary today considering their rapid disappearance and degradation rates in recent times. In this study, the pressure-state-response model encompassing all the physical, ecological and socioeconomic variables along with Shannon entropy method and the technique for order of preference by similarity to ideal solution (TOPSIS) were used to comprehend wetland ecosystem health in the intensely humanized floodplains of Ichhamati River of West Bengal. Remote sensing-based data, rigorous field investigation and socioeconomic appraisals were used to develop a wetland ecosystem health evaluation index for understanding condition of selected seven floodplain wetlands of River Ichhamati from 2016 to 2020. Wetland ecosystem health is actually an outcome of synthesizing criteria and indicators (C&Is) of pressure system, state system, and response system. Moreover, the values of pressure, state and response were classified with the ideal values and grade values. Thereafter, the health status of wetland ecosystems was assessed and influencing factors of wetland health were identified. Finally, a total of 5-evaluation grades was determined as: Excellent health (1.0-0.8), Good health (0.8-0.6), Moderate health (0.6-0.4), Weak health (0.4-0.2), and Morbid (0.2-0.0) based on the values of ideal alternatives for each assessment year. Results indicated that health of pressure, state and response system of Panchpota, Panchita, Aromdanga wetlands was found to be Weak to Morbid health status ($\leq 40\%$) in both 2016 and 2020; health of state and response system of Berkrishnapur wetland and pressure health of Gopalnagar wetland was also indicated Weak to Morbid health ($\leq 40\%$) in both years. However, Manigram wetland exhibited Moderate health (60% to 40%) in PSR system in 2016 and PS system in 2020 with little bit improvement in health response system *i.e.*, Good health (80% to 60%) in 2020 due to several focus group discussions with wetland stakeholders. Only, Madhabpur wetland have shown Excellent to good health in both years with good community practices. It was keenly observed that if jute retting, agricultural washouts and wastewater from various sources, weed infestation and its decomposition and eutrophication are prevailed in these wetlands at the same pace, waning of wetland ecological health (WEH) will drastically increase in imminent years. Therefore, few relevant management measures at regional level, wetland complex specific and wetland specific were inferred for sustainable restoration and protection of these fragile wetlands.

Keywords: *Anthropogenic stress, Criteria and Indicators, Entropy, Wetland Ecological Health, Habitat fragmentation, Landscape ecology, PSR model, TOPSIS*

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