

RESEARCH ARTICLE

Impact of climate and irrigation practices on hydrological aspects of Bundala wetlands in Sri Lanka

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Abstract

Bundala wetlands are the first to be declared a Ramsar wetland reserve in Sri Lanka. Two wetlands of this complex have transformed from seasonally inundated saline areas into permanent freshwater ecosystems, resulting in spatial and temporal changes that presumably have favoured plant invasions. We hypothesized that climate/rainfall changes and irrigation practices would be the most potential drivers of this change, and the objective of this research is to empirically determine the influence of rainfall and irrigation practices in the catchment on inundation pattern and plant nutrient availability that could potentially change ecology of these wetlands. Monthly rainfall data for the Bundala area (1988–2017) from Sri Lanka's meteorological department were analysed by parametric and nonparametric statistical methods, and a statistically significant change in rainfall was not discernible, confirming climate change is unlikely to be a driver to increase the lagoon water level. Irrigation data analysis revealed that these wetlands receive nearly $1.28 \times 10^7 \text{ m}^3$ of irrigation drainage annually from an irrigation scheme in the immediate catchment, which has resulted in decreased salinity, while inundation and plant nutrient content increased, changing the wetlands' ecology and socioeconomic status of the dependent rural communities.

KEYWORDS

coastal wetlands, hydrological changes, irrigation practices, plant invasion, rainfall

Résumé

Les zones humides de Bundala sont les premières à être déclarées réserve de zones humides de RAMSAR au Sri Lanka. Deux zones humides de ce complexe se sont transformées de zones salines inondées de façon saisonnière en écosystèmes d'eau douce permanents, entraînant des changements spatiaux et temporels qui ont vraisemblablement favorisé les invasions de plantes. Nous avons