

# **Comparative Analysis of Water Hyacinth Dynamics in North Bolgoda Lake, Sri Lanka: A Classification Based on High-resolution Aerial Imagery and Satellite-imagery**

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## **Abstract**

Water hyacinth (WH) is an invasive aquatic plant that has established its presence in tropical and subtropical regions around the globe. Its widespread existence has resulted in societal, economic, and ecological impacts that are mostly intolerable. Understanding and monitoring the spatial and seasonal dynamics of WH in the respective environments could provide insights to mitigate its environmental impact. This study attempts to identify seasonal patterns of WH within north Bolgoda Lake over four years (2019-2022). The methodology includes a pixel-based random forest (RF) classification utilising five distinct spectral indices in conjunction with raw Sentinel-2 spectral bands, operationalised through the Google Earth Engine (GEE) platform. The aerial imageries were classified using Esri ArcGIS Pro software. The outcomes of this study indicate an increase of WH proliferation during the wet season (May-November) over the dry season (December- April) with an overall accuracy of 82% for aerial imagery and 98% for satellite imagery. Data fusion techniques are proposed to overcome the limitations of employing two different forms of remote sensing data individually. Despite the challenges, this study reveals important insights into the scalability of input data to specific requirements and under restricted conditions.

**Keywords:** Image analysis, Invasive plants, Multi-spectral data, Random forest classification