**Deep Learning based Approach to Assess the Impact of Cyclone Ockhi on Coconut Tree Populations using Satellite Images**

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***ABSTRACT***

Manual counting of coconut trees has numerous challenges that can compromise the accuracy, efficiency, and feasibility of the process, especially on a large scale. These problems highlight the need for automated counting methods that leverage high-resolution satellite imagery and advanced image processing techniques to provide more reliable, cost-effective, and scalable solutions for monitoring coconut tree populations. This work focuses on the assessment of coconut tree populations before and after the Ockhi cyclone in Kanyakumari District, south India using high-resolution satellite imagery. The destructive impact of cyclones on agricultural landscapes, particularly coconut plantations, necessitates accurate and timely monitoring to inform recovery and replanting efforts. In this work we used Landsat8 OLI satellite images captured at intervals before and after the cyclone event to quantify the changes in coconut tree density. Advanced deep learning technique based on object detection framework (YOLO v8) is used to count individual coconut trees in the image. YOLO v8 is specifically designed for real-time object detection, which involves identifying and locating multiple objects within an image. The results revealed a significant reduction in coconut tree count post-cyclone, providing critical data for agricultural planning and disaster management. This methodology demonstrates the effectiveness of satellite imagery in environmental monitoring and offers a replicable model for similar assessments in cyclone-prone regions.

**Keywords:** coconut tree, YOLO, satellite image, Ockhi cyclone