

Application of underwater imagery and drone technology for coral reef assessment in *Kayankerni* Marine Sanctuary, Sri Lanka

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Coral reefs are vital ecosystems supporting marine life. However, they face threats from climate change, pollution, anthropogenic factors, etc. The *Kayankerni* Marine Sanctuary has rich coral biodiversity and is particularly susceptible to these pressures. This study leverages drone technology to enhance coral conservation efforts by providing high-resolution aerial imagery with field surveys. We conducted aerial surveys using DJI Phantom 4 pro drone at an altitude of 15 m to capture detailed imagery of the coral reefs. The flight path was created with the PIX4D-capture mobile application. Underwater transect surveys were performed by snorkelling to take images of coral reefs. The drone images were uploaded to the Drone Deploy website, and orthomosaic map was created with 85% side and front overlapping. Using a digital elevation model and an orthomosaic map as references, the coral cover was calculated using ArcMap 10.8 software. With the calculations out of a total area of 79428.29 m² in the *Kayankerni* Coral Reef, the coral cover was obtained as 13126.58 m². Live coral and dead coral with algae percentages were 51.75% and 33.60%, respectively. Images captured during the transect survey were further analyzed with CPCe 4.1 (Coral Point Count with Excel extension) to get data on coral diversity. Seagrasses constituted 0.16% of the observed area, while the Shannon-Wiener diversity index and Simpson's index for coral reefs were 0.77 and 0.29, referenced to CPCe 4.1. According to drone imagery, coral cover exists in 16.52% of the study area. Comparatively, the percentage of live coral was higher, and coral exhibited high level of species diversity. There was a slightly higher dominance of *Acropora sp.*, *Echinopora sp.*, *Porites sp.*, and *Montipora sp.* This study highlights integrating advanced remote sensing drone technology with ground-truthed assessments for better management practices and to promote sustainable conservation strategies for Sri Lankan coral reef ecosystems.

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