Acoustic Index Provides Information on the Biodiversity of Coral Reefs

Bingjia Huang
Ocean College, Zhejiang University, China

Xiaoping Wang
Ocean College, Zhejiang University, China

Abstract

The field of Passive Acoustic Monitoring (PAM) has proven valuable in quantifying the characteristics of natural soundscapes, offering new methods for assessing marine ecosystem health. This study explores the effectiveness of five commonly used acoustic indices—ACI, BI, H, M, and NDSI—in evaluating the ecological status of coral reefs. Using sound data from three coral reef sites in Sanya, South China Sea, the indices were analyzed across three frequency bands to assess their ability to reflect coral reef health. Results showed that ACI and H, which measure sound variability, were correlated with species diversity in some cases, although boat noise interfered with their effectiveness. The BI index, representing sound intensity, was indicative of organism abundance and diversity, while NDSI, which measures the ratio of low- to medium-frequency sounds, provided insights into invertebrate presence but had lower classification accuracy. Furthermore, combining multiple acoustic indices in a compound index improved classification accuracy and reduced error. This study highlights the potential of PAM-based acoustic indices for long-term, low-cost ecological monitoring of coral reefs, facilitating more accurate habitat assessments.

Keywords

Acoustic index, Biodiversity, Coral reef, Ecoacoustics, Passive acoustic monitoring (PAM), Soundscape.