

ABSTRACT

Phytoplankton are primary producers in aquatic ecosystems, forming the base of the food web and serving as vital bioindicators of water quality. This study investigated the phytoplankton community structure in the coastal waters of Cemara Beach, Bireuen Regency. The objectives were to identify species composition and abundance, analyze biodiversity indices, and assess physicochemical water parameters. Sampling was conducted in November 2024 using a purposive sampling method at three stations characterized by different human activities: tourism, aquaculture, and river estuary influence. A total of 24 phytoplankton species were identified, belonging to the classes Bacillariophyceae, Dinophyceae, Phrymnesiophyceae, and Cyanophyceae, with *Synedra* sp. as the dominant species. Phytoplankton abundance ranged from 10,200 to 21,700 cells/mL, with the highest abundance observed near the tourism area. Diversity indices (1.71–2.56) indicated moderate biodiversity, while evenness indices (0.82–0.87) reflected a stable species distribution. Dominance indices (0.10–0.22) revealed low single-species dominance. Water quality parameters, including temperature (31.76–31.92°C), salinity (32.67–33.22 ppt), pH (7.78–7.89), and dissolved oxygen (5.68–5.93 mg/L), were generally within the suitable range for phytoplankton, although elevated temperatures may limit optimal growth. The study concludes that human activities significantly influence phytoplankton dynamics and water quality in the area.

Keywords: phytoplankton, community structure, cemara beach, water quality parameters