

ABSTRACT

The horseshoe crab is one of the marine biota that plays an important ecological and economic role, but its population continues to decline due to habitat degradation and changes in water quality. This study aims to identify the morphometric characteristics of horseshoe crabs, analyze the relationship between morphometry and water quality, and determine the habitat environmental parameters of horseshoe crabs in the waters of Kuala Langsa. This research was conducted in May 2026 at four observation stations using a descriptive method with purposive sampling technique, measuring morphometric characteristics that include 13 body parameters and individual weight. The measured environmental quality parameters include temperature, salinity, pH, dissolved oxygen (DO), depth, and sediment fraction. The analysis of the relationship between morphometry and environmental quality was conducted using Principal Component Analysis (PCA). The obtained sample consisted of 34 individuals of the *T. gigas* species, comprising 21 females and 13 males. The research results show that the morphometric characteristics of the horseshoe crab *T. gigas* vary across all measured parameters. Most of the highest morphometric values were found at Station 1, while the lowest values were generally found at Station 3 and Station 4. The variation is suspected to be influenced by differences in sex composition, individual size, and habitat conditions. The results of the *one-way* ANOVA test showed that the characters PTO, PBA, and body weight differed significantly between stations ($p > 0.05$), while the Pearson correlation results indicated that the relationship between morphometric characters and water quality varied. The PCA analysis results showed that the morphometric characters of the horseshoe crab *T. gigas* had a stronger relationship with the parameters of salinity, water depth, and sand fraction, while temperature, pH, DO, and mud fraction showed relatively weaker relationships. The environmental quality parameters in the waters of Kuala Langsa are still within the appropriate range to support the life and growth of the horseshoe crab *T. gigas*.

Keywords: *horseshoe crab*, morphometrics, water quality, *Principal Component Analysis*, Kuala Langsa.