PHYTOPLANKTON DIVERSITY AND ABUNDANCE IN A 15-YEAR ABANDONED GRANITE QUARRY: A PILOT STUDY IN BANDARAGAMA, SRI LANKA

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The growing scarcity of freshwater resources globally, with 70% of the world's population may encounter water shortages by 2050, highlights the need for alternative water sources for aquaculture. This study explores the phytoplankton diversity and abundance in a 15-year abandoned granite quarry in Gungamuwa, Bandaragama, Sri Lanka, an isolated, rain-fed water body that has evolved into a self-contained aquatic environment. The quarry, with its impermeable granite lining and basin-like structure, has developed a biologically rich ecosystem over time. Therefore, the present study aimed at providing an opportunity to assess its potential for supporting extensive aquaculture. Phytoplankton sampling was conducted over three weeks in September 2024 using phytoplankton net (50 µm mesh size). Samples were collected at two sites in triplicate, preserved with Lugol's solution, and identified to the lowest taxonomic level using standard guides and keys. Quantification was performed by counting organisms within a Sedgewick-Rafter chamber. A total of 20 species were recorded, including representatives from Chlorophyceae, Cyanophyceae, Zygnematophyceae, Trebouxiophyceae, Ulvophyceae, and Bacillariophyceae. The most abundant species in both sites was Microspora, comprising 72.35% of the total relative abundance, while the least abundant were Oscillatoria, Golenkinia, Coelastrium, Stigeoclonium, *Phytoconis*, and *Gomphosphaeria* (0.25% each). Site 02 had the highest total abundance (240 individuals out of 405), while Site 01 exhibited greater species richness (14 species vs. 11 at Site 02). The Shannon-Wiener diversity index was higher at Site 01 (H = 2.546) compared to Site 02 (H = 1.82), suggesting better habitat structure and water quality at Site 01. Margalef's species richness index also indicated greater biodiversity at Site 01 (SR = 2.546) than at Site 02 (SR = 1.824), with lower diversity at Site 02 potentially attributed to environmental stressors. These findings suggest that the abandoned quarry supports a stable, diverse plankton community, making it suitable for aquaculture purposes. However, it is recommended to continuous monitoring of these parameters at least for one year period.

Keywords: Abundance; Aquaculture; Diversity; Granite quarry; Phytoplankton.