

ABSTRACT

THE LIMNOLOGY OF LAKE WOOD AND INSIGHTS INTO THE ECOLOGY OF ITS PELAGIC CRUSTACEAN ZOOPLANKTON COMMUNITY

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Relatively scant information on the limnology and ecology exist for Lake Wood. The present work provides the first thorough limnological characterization of the lake – exploring its physical, chemical, and biological features, as well as the interrelationships of pelagic crustacean zooplankton. Zooplankton are key ecosystem component in the pelagic food web, intermediary between primary producers and higher trophic consumers, and thus essential for the functioning of the pelagic community. These organisms move vertically in a water column on a daily cycle to avoid visual predators (i.e. fish) that prey them, a phenomenon known as diel vertical migration (DVM). Thus, the purpose of this work is to elucidate the dynamics of the daily vertical migration of zooplankton, to uncover the factor that governs their migration behavior, and to equally provide the limnology of Lake Wood, an ancestral lake of the Subanens. Here, the morphology, bathymetry, climate, trophic status, zooplankton composition as well as its migration amplitude, and other biota of Lake Wood are described based on the data collected in October-November 2018 and March-April 2019. Zooplankton, including environmental parameters, were sampled in the deepest part of the lake at several depths (1 m, 15 m, 30 m, 50 m, and 70 m) during noon and midnight, following the lunar phases of the moon.

Located at 320 m above sea level, the lake has an extensive surface area covering 7.38 km² with a maximum depth of 85 m, and a residence time of 32 years. Based on the trophic state index (TSI), the current trophic status of the lake is already classified as eutrophic. Lake water comes from rainfall, small rivers, and the surrounding groundwater, and empties into the Dumanquilas Bay via its lone outflow, the Biswangan River. During the sampling period, a striking formation of thermocline and oxycline at 15 m was noted, but the latter did not persist towards the end of April. Three cladocerans (*Ceriodaphnia cornuta*, *Diaphanosoma sarsi*, and *Moina micrura*) and one copepod species (*Thermocyclops crassus*) were detected. Results showed that the dominant zooplankton are *T. crassus*, which indicates that high abundance of

this species as compared with calanoid copepods together with the presence of the identified cladocerans in Lake Wood suggest that the lake is already eutrophic, confirming the previously mentioned trophic state of the lake. In the present work, predation was highlighted as the factor that governs the migration amplitude of zooplankton species, and hence, shapes the structure of the zooplankton community due to the lack of significant relationship between the migration amplitude of zooplankton and the environmental variables. The herbivorous cladocerans displayed reverse diel vertical migration as an escape response from invertebrate predators, *T. crassus*, which performed normal diel vertical migration. Cladocerans have highly transparent body, while copepods have pellucid body color rendering them more visible to visual predators during the day. When confronted by planktivorous fish, cladocerans can play dead, and they swim fast compared to copepods that are rather slow. As a result, during the day copepods seek refuge to deeper waters while cladocerans spend their lives at surface waters. This essential interrelationships between invertebrate predators and herbivorous zooplankton is a glaring evidence that the length of the lake's food web may be longer, resulting to less fish production at the top of the food web. Conservation of the lake as a functioning ecosystem is necessary because it serves not only as a home to migratory bird, *Anas luzonica*, but also the habitat of the endemic cyprinid, *Rasbora philippina* (locally known as 'porang'). Finally, the present work would serve as a baseline data in developing programs towards the protection of the lake. Such data potentially provides a base dataset and a basis for the assessment of the environmental vulnerability of the lake.

Keywords: Lake Wood, lake morphology, trophic state index, crustacean zooplankton, invertebrate predators, *Rasbora philippina*