



Biogeochemical characteristics of Lakes in Western Papua, Indonesia

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Like in most other tropical regions, not much is known about the limnology and (bio-) geochemical state of lakes in Indonesia, especially in the eastern part of the country.

Here, for the first time in this region, we investigated biogeochemical processes and nitrogen biogeochemistry in the water column and surficial sediment of two different lakes in western Papua. We put our focus on links between catchment composition on the one side and biogeochemical processes in the water column and within the sediments, as well as the fate of ammonium that is liberated within the sediments, on the other. Two pilot campaigns were conducted in April and November 2017 to measure water column parameters (pH, Dissolved Oxygen, Temperature, anions, and cations) and to take short (max 80 cm long) sediment cores at several locations in the two lakes.

Lake Sentani consists of four separate basins with maximum water depths of 30 to 40 m, separated by shallow sills. The lake has a geologically very diverse catchment, comprised of many different lithologies. Although all four basins share almost identical surface water chemistry and exhibit sub- to anoxic bottom waters, each basin displays its distinct water column stratification regime and sediment geochemistry. This lake thus harbors a great potential as a natural laboratory for conducting biogeochemical process studies under different environmental/geochemical conditions.

Lake Ayamaru is located on a densely forested karstified carbonate platform. The lake level has dropped significantly in recent years due to water loss into the karst, further reduction of open water surface is caused by massive growth of *Pistia*, a floating plant. Currently the lake has a maximum depth of around 3 m. Its sediment is mainly composed of carbonate minerals, and is methane saturated.

In this first baseline survey for both lakes, we carried out detailed analyses of the sediment and its pore water, including analysis of dissolved anions and cations, XRF and XRD analyses of the solid phase, as well as $\delta^{15}\text{N}$ of pore water ammonium. The data show that the water column and sediment chemistry are strongly controlled by the catchment, which in turn is controlled by climate, morphology and land use. Moreover, they suggest a complex benthic N-cycle, where the (anaerobic) oxidation of ammonium within the sediment pore water does not seem to follow canonical/expected N isotope fractionation patterns.