

Investigation of factors affecting water characteristics of the Kahayan and Sebangau Rivers
in Central Kalimantan, Indonesia

(インドネシア中央カリマンタン島のカハヤン川及びセバンガウ川の水質に影響を与える因子に関する調査研究)

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[Introduction] The Kahayan and Sebangau Rivers are located in the southern part of Central Kalimantan. Almost the entire catchment areas of these rivers are covered by swamp forest with a high concentration of humic substances in the water. The Sebangau River has a dark black colour with a pH of 3.5 – 4.0, on the contrary, the Kahayan River which is located at 10 to 54 km from the Sebangau River, has a brown colour with pH of 5.5 – 6.5. The aim of this research is to find out the factors causing the differences especially in water quality by evaluating several aspects such as land cover, physicochemical properties of the river water, and aquatic humic substances as the major organic compound primarily in the Sebangau River.

[Methods] The maps of the watershed land cover were analysed by QGIS software. Water sampling was conducted in dry season, July 2016. Conductivity, total dissolved solid (TDS), pH, and turbidity were measured *in situ*. Total suspended solid (TSS) was measured based on EPA Method 160.1. Total organic carbon (TOC) was analysed by a TOC Analyser, and SUVA₂₅₄ was calculated based on TOC concentration and UV-Vis absorbance at 254 nm. To understand the differences in humic substances, the isolation and purification from 62 L and 32 L water taken from the two rivers were done according to the method recommended by IHSS. The characterization of humic and fulvic acids was performed by elemental composition analysis and UV-Vis absorbance spectroscopy. The UV-Vis spectral ratios of E2/E3 and E4/E6 of each fraction were determined by the measurement at 250 and 365, and 465 and 665 nm, respectively.

[Results and Discussion] Land cover analysis showed that the Sebangau River mostly influenced by peatland in swamp area, on the contrary, the Kahayan River was naturally besides influenced by peatland, also by mineral soil in the dry forest area. Others, such as mining activities in the upstream of the Kahayan River also contributed to the water quality, primarily in the case of TSS concentration. In general, conductivity, TDS, and TOC of the Kahayan River were lower than the Sebangau River. By contrast, pH and TSS were higher, and SUVA₂₅₄ was similar. These evidences showed that peatland strongly influenced the Sebangau River, meanwhile the Kahayan River was slightly influenced. The yields of humic and fulvic acids extracted from the Sebangau River were significantly higher than those from the Kahayan River. These high amount of humic substances in the Sebangau River affected its water colour, but not with the Kahayan River. The quotient of E2/E3 and E4/E6 showed that the aromaticity of humic and fulvic acids from the Sebangau River were slightly higher and contained more humified materials from peatland compared with those from the Kahayan River.

[Conclusion] The Sebangau River was entirely influenced by peatland, and the Kahayan River was influenced by mineral soil and mining activities which were mostly in the upstream, and also by peatland from its tributaries.