

Analysis of Water Quality Monitoring Pin-Supu Forest Reserve & Buffer Zones 2017

Background/Introduction

The long-term monitoring of forest environment within Pin-Supu Forest Reserve and buffer zones revolves around 3 major areas (a) Forest Monitoring, (b) Wildlife Monitoring, and (c) Water Quality Monitoring. This report is a summary of the analysis of the Wildlife Monitoring.

The Water Quality Monitoring in Pin Supu Forest Reserve is carried out by the community cooperative KOPEL Bhd. This work has been ongoing since 2010 and has compiled data on 5 stations in water intake point, point discharge of Kg Mengaris, Kaboi tributary and the Kinabatangan main stream (which is the boundary for Pin Supu Forest Reserve) –refer to Map 1.

Data collected is compared with the National Water Quality Standards for Malaysia to determine the status of water quality in sampled area- Table 1

Analysis of Data 2017

1. Dissolved oxygen at most of the sampling point fluctuate between Class I and II except for Kaboi tributary that fluctuated between Class II and class V; and Tungog lake that constantly under class IV and V. The extreme fluctuation in oxygen level at Kaboi tributary is caused by long period of flood on several occasions in 2017 that inundated the forest floor. The organic matter on the forest floor has used up oxygen in the water for bacterial decomposition. Resulting low oxygen water is discharged after flood. Tungog Lake is experiencing anoxic and hypoxic condition at the upper layer of the lake along 2017. The condition is caused by the bacterial decomposition of dead organic material and covering of invasive weed (*Salvinia molesta*) on the lake surface. The oxygen level is not feasible conditions for most aquatic life except for fish that adapt to this condition- see figure 1.
2. The chemical oxygen demand in Kaboi Tributary is significantly high during water discharge after of flood (Jan- Feb). Large amount of oxygen required during this time to oxidize the soluble and particulate organic matter in water. The condition could be considered as normal as the organic rich water is flowing out from the nearby peat swamp. The discharged water from Kaboi tributary has increased the COD in main river sampling point (SK 3). Tungog Lake shows the opposite, the lake does not display significant high chemical oxygen demand although the lake contain large amount of organic matter from the dead organic matter (*Salvinia molesta*) - see figure 2.
3. The conductivity in most of the sampling point is considerably normal. The concentration of ions fall into class I and II in most sampling point except for the Kaboi tributary that shows slightly high concentration of ions but not critical. The concentration of ions could be contributed by the chemical fertilizer run-off used by the adjacent palm oil plantation into nearby swamp forest and Lake- see figure 3.

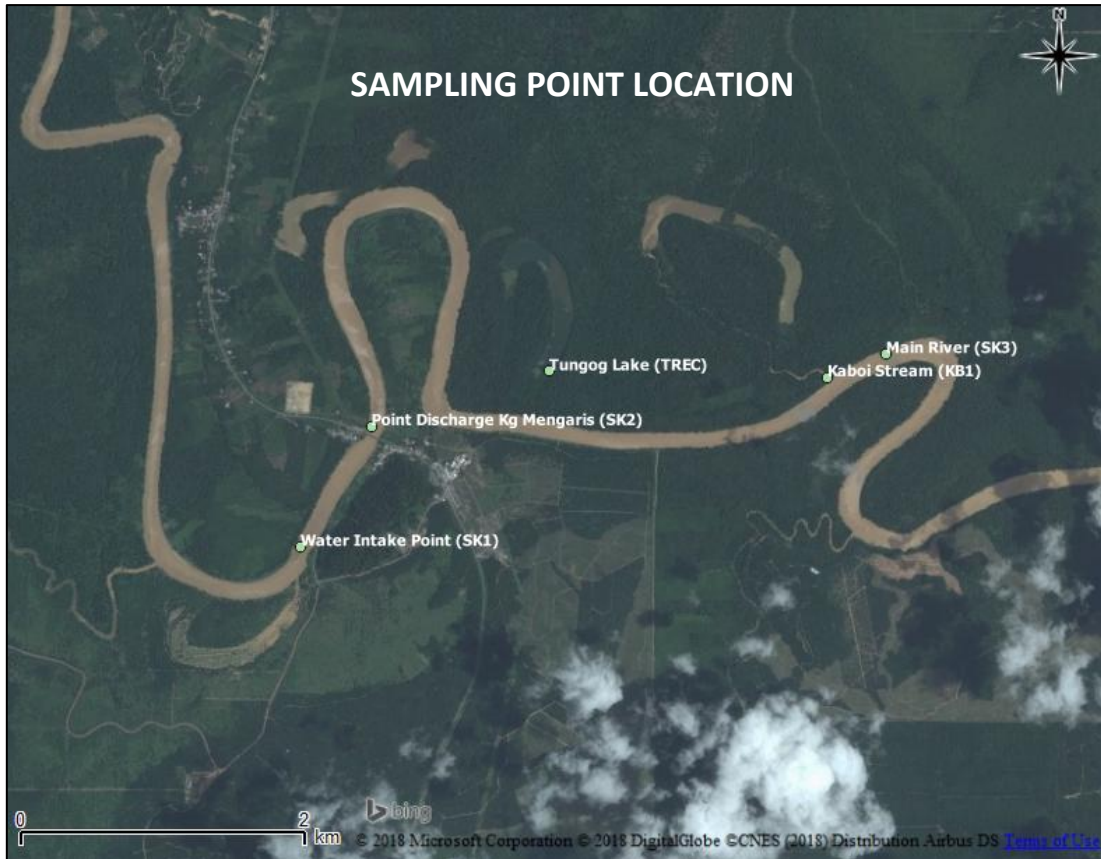
Conclusions & Management Implications

1. The water quality monitoring in 2017 alone did not provide conclusive evidence to determine the need for corrective action in any of the immediate surrounding area upstream or adjacent to Pin Supu Forest Reserve (in the headwaters of Pin Supu Forest Reserve).
2. Tungog Lake is in critical condition due to suffocation from the covering of invasive weed (*Salvinia molesta*). The aquatic life is threatened from the low oxygen conditions that cause ecological imbalance and localised extinction of aquatic species. The local community partner KOPEL Bhd has been working on removing this weed through alternative manual and mechanical approaches for more than 12 years but with mixed success. Over the same period this invasive water weed has spread from Tungog Lake to more 55% of the fresh water lakes along the Lower Kinabatangan and is severely threatening rare and endangered aquatic biodiversity in this region.
3. It is strongly recommended that the Sabah Forestry Department should take further action to support a sustainable, multi department, integrated pest management approach to tackle the Salvinia weed problem in PSFR and the surrounding region.
4. The water quality monitoring program involves 100% the local community hence supports (a) local awareness raising, (b) employment benefits to local community, and (c) inclusivity of local community in the co-management of Pin Supu Forest Reserve.

Maps, Tables & Graphs:

Table 1: Water classes and uses

CLASS	USES
Class I	Conservation of natural environment. Water Supply I - Practically no treatment necessary. Fishery I - Very sensitive aquatic species.
Class IIA	Water Supply II - Conventional treatment. Fishery II - Sensitive aquatic species.
Class IIB	Recreational use body contact.
Class III	Water Supply III - Extensive treatment required. Fishery III - Common, of economic value and tolerant species; livestock drinking.
Class IV	Irrigation
Class V	None of the above.



Map 1: sampling point is chosen in important location such as water intake point, discharge point, streams and lake

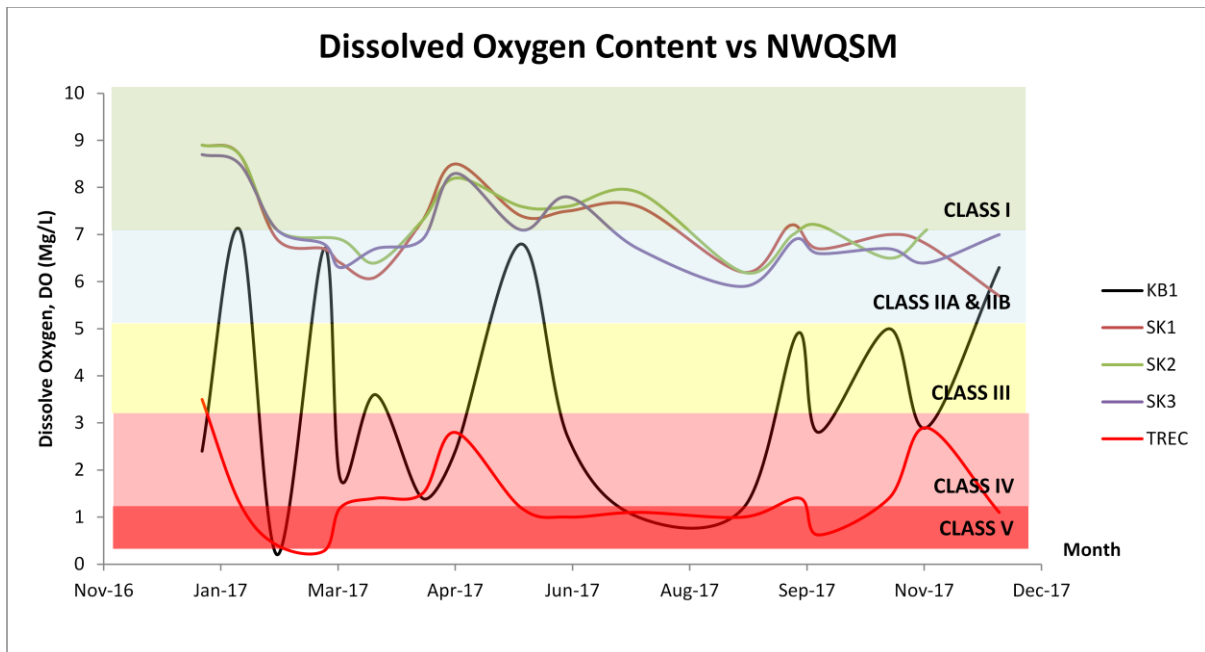


Figure 1: Kaboi Lake shows fluctuation from class II and V and Tungog Lake constantly fluctuated in class IV and V

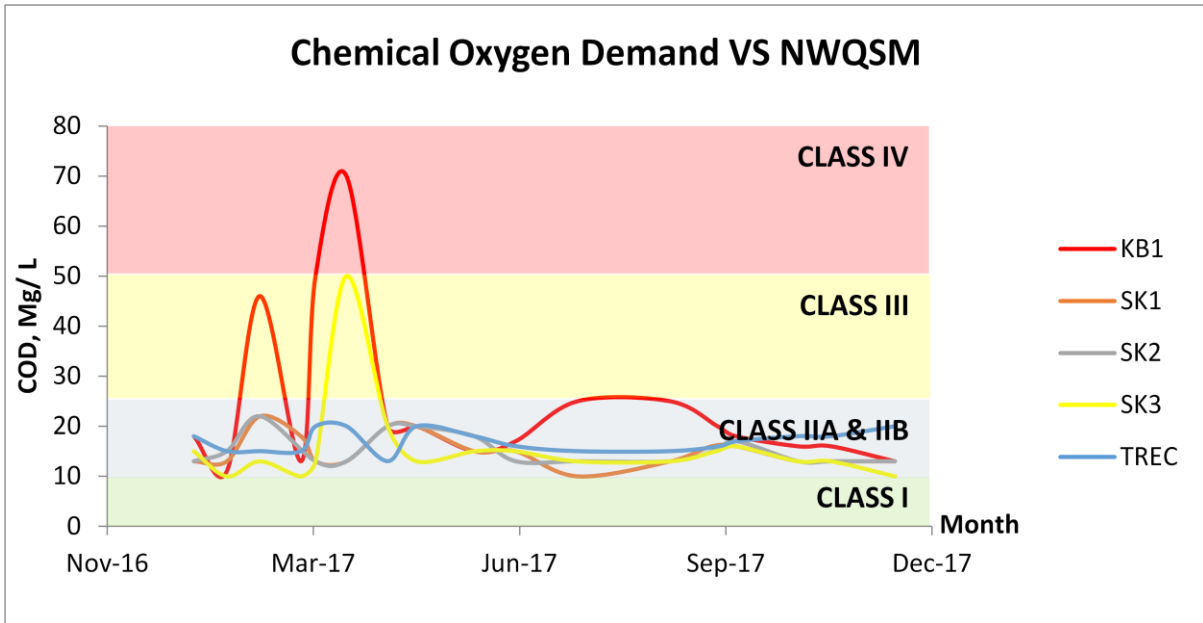


Figure 2: The chemical oxygen demand in Kaboi tributary showing high value of COD followed by the Kinabatangan stream (SK3)

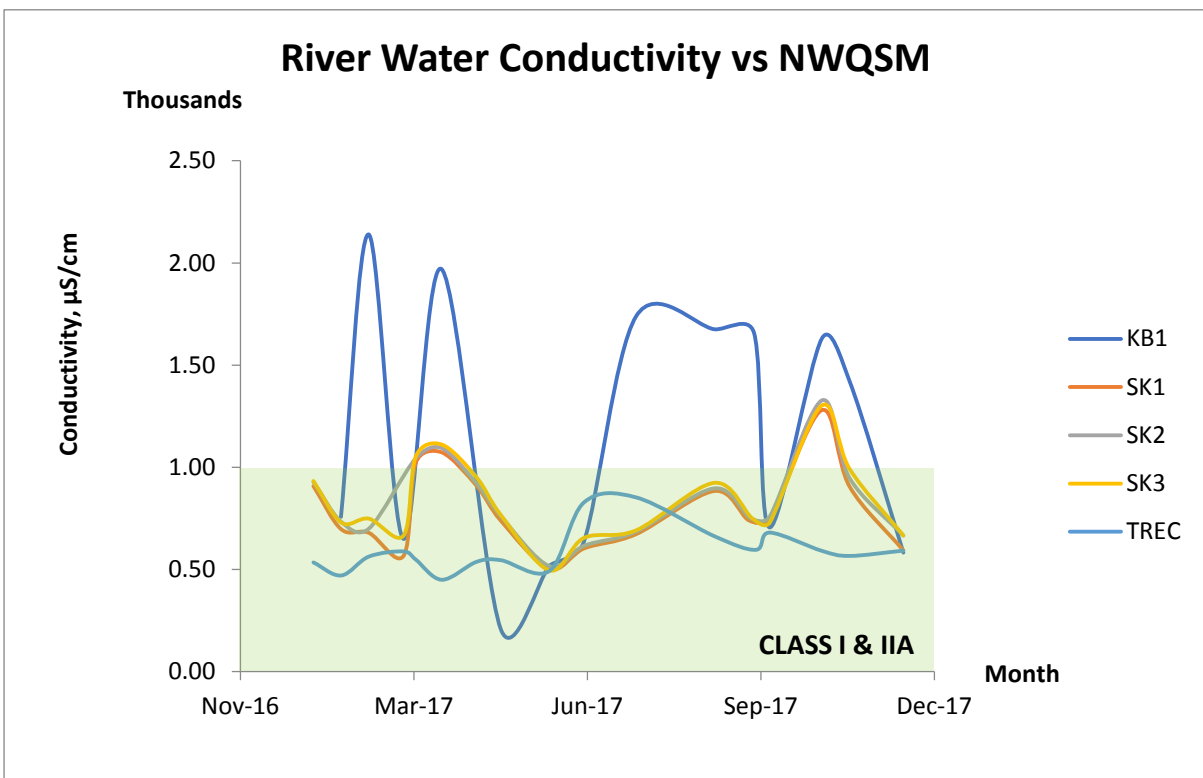


Figure 3: The conductivity of Kaboi Tributary is slightly high and fluctuate in 2017