INTISARI

Sungai Winongo salah satu sungai yang mengalir di tengah Provinsi DIY bermuara di sungai Opak, status pencemaran dikategorikan berat disampaikan oleh BLH DIY pada tahun 2012. Data parameter kualitas air dari BLH terdapat data yang dinamis dan kurang baik, seperti data kosong, menyimpang, dan tidak konsisten. Penelitian ini bertujuan untuk menentukan parameter kualitas air signifikan, dan mencari Indeks Kualitas Air (IKA) yang dapat menjelaskan tingkat pencemaran sungai Winongo, serta hubungannya dengan aliran air sungai Winongo untuk pengendalian pencemaran air.

Data sekunder dari Badan Lingkungan Hidup DIY pada pengamatan tahun 2004 - 2015 di 8 titik pemantauan di sungai Winongo. Analisa penentukan parameter kualitas air signifikan dimulai dari seleksi 36 parameter kualitas air, *smoothing* data, standarisasi/ transformasi yang dikembangkan oleh Saraswati pada tahun 2015, kemudian uji validitas dengan aplikasi SPSS versi 1.6, selanjutnya metodologi *Principal Component Analysis* (PCA) Biplot *Add In.* Persamaan Indeks Kualitas Air (IKA) disusun sesuai langkah IKAs dengan metoda analisa faktor dari nilai hasil PCA. Simulasi pengendalian pencemaran air sungai dilakukan dengan mencari hubungan aliran air sungai dan IKA, dengan pendekatan baku mutu konservasi kualitas air pada penelitian sungai Gajahwong.

Hasil penelitian menunjukkan ada 19 parameter kualitas air memiliki data bagus, dan perhitungan PCA *Biplot add in* mendapatkan 6 parameter signifikan, yaitu EC, DO, COD, NH_3N, *E. Coli*, dan *Total Coliform*. Untuk rumus IKAs sungai Winongo yaitu : 0,35 EC_t + 0,19 DO_t + 0,05 COD_t + 0,04 NH_3N_t + 0,05 TC_t, sebagai pembangding IKAs sungai Gajahwong pada disertasi Saraswati tahun 2015 adalah 0,2 EC_t +0,15 COD_t + 0,21 DO_t + 0,20 NH_3N_t + 0,10 TC_t yang artinya memiliki kesamaan parameter signifikan kualitas air dan di lahan sumber pencemar yang sama. Hasil sebaran grafik hubungan antara aliran dengan IKAs sungai Winongo menunjukkan bahwa di hulu 1&2 (Sleman) 86%-97% kondisi baik, pada debit 0,014 – 2,46 m^3/detik, di tengah 1,2,3 & 4 (Yogyakarta) 11% – 50% kondisi baik, pada debit 0,07 – 11,2 m^3/detik, sementara di hilir 1&2 (Bantul) yaitu 8% kondisi baik, pada debit 0,02 – 9,14 m^3/detik. Sungai Gajahwong di hulu 1&2 (Sleman) 13%-70% kondisi baik, pada debit 0,07 – 3,5 m^3/detik, di tengah 1,2,3,4 (Yogyakarta) 3%-6% kondisi baik, pada debit 0,01 – 7,84 m^3/detik, dan di hilir 1&2 (Bantul) 3% kondisi baik, pada debit 0,01 – 9,1 m^3/detik. Ada pola kecenderungan jika aliran besar saat hujan tingkat pencemaran turun, dan jika aliran kecil saat kemarau sungai tetap tercemar. Upaya pengaturan aliran sungai dengan menampung air saat musim hujan pada kolam retensi/embung dan melepaskannya saat musim kemarau dapat menjadi saran solusi yang perlu diteliti lebih lanjut.

Kata Kunci: Sungai Winongo, standarisasi/transformasi, parameter kualitas air signifikan, PCA, dan IKAs.

ABSTRACT

Winongo River is one of the river in the center of DIY province's area that flows to the Opak river, which is categorized into severely polluted status according to data from Environmental Agency (BLH DIY) in 2012. Data quality parameters of water from BLH showed a dynamic and less good data, such as empty data, deviation, and inconsistency. This study aims to determine significant water quality parameters, and the Water Quality Index (IKA) that can describe the pollution level of Winongo river, as well as its relationship with the Winongo river water flow for water pollution control.

Secondary data was taken from the Environmental Agency's data observations from 2004 - 2015 at 8 monitoring points at the Winongo river. The analysis of the significant water quality parameters determination started from the selection of 36 parameters of water quality, smoothing data, and standardization/transformation which had been developed by Saraswati in 2015. Furthermore, the validity test used SPSS version 1.6 application, then Biplot Add In Methodology of Principal Component Analysis (PCA). The Water Quality Index (IKA) equation was arranged according to the IKA's process by factor analysis method of PCA result value. The simulation of river water contamination control was performed by finding the relation of river water flow and IKA, with research methodology of water quality conservation quality standard in Gajahwong river.

The results showed that 19 parameters of water quality had good data, and PCA Biplot add in calculations obtained 6 significant parameters, i.e. EC, DO, COD, NH_3N, E. Coli, and *Total Coliform*. For the formula of IKA at Winongo rive, i.e. 0.35 EC_t + 0.19 DO_t + 0.05 COD_t + 0.04 NH_3N_t + 0.05 TC_t, as comparison to the IKA of Gajahwong river which was stated in the dissertation of Saraswati (2015), that was 0.2 EC_t +0.15 COD_t + 0.21 DO_t + 0.20 NH_3N_t + 0.10 TC_t which means it has the same significant parameter of water quality and at the same pollutant source. The graphic distribution result of the relationship between the flow with IKA of Winongo River showed that in the upstream area of 1 & 2 (Sleman), there were 86% -97% in a good condition, at the discharge of 0.014 - 2.46 m^3/sec; at the middle area of 1,2,3 & 4 (Yogyakarta) were 11 % - 50% in a good condition; at the discharge of 0.07 – 11.2 m^3/sec; while at downstream area of 1 & 2 (Bantul) had 8% in a good condition, at discharge of of 0.02 – 9.14 m^3/sec. At Gajahwong River in upstream area of 1 & 2 (Sleman) were 13% -70% in a good condition, at discharge of 0.07 - 3.5 m^3/sec, in the middle 1,2,3,4 (Yogyakarta) were 3% -6% good condition, at the discharge of 0.01 – 7.84 m^3/sec, and downstream area of 1 & 2 (Bantul) were 3% in a good condition, at discharge of 0.01 – 9.1 m^3/sec. The research shows a conclusion that during rain season, the flow was high, then the pollution levels decreased. When there was a small stream during dry season, it was still polluted. It needs some efforts to control the river flow by collecting water during the rainy season in the retention pond/*embung* and releases it during the dry season which needs further investigation.

Keywords: Winongo River, standardization/transformation, significant water quality parameters, PCA, and IKA