EVALUASI DAN OPTIMALISASI KINERJA INSTALASI PENGOLAHAN AIR LIMBAH (IPAL) KOMUNAL SEHAT LESTARI DI PADUKUHAN PANASAN, KALURAHAN TRIHARJO, KAPANEWON SLEMAN, KABUPATEN SLEMAN, DAERAH ISTIMEWA YOGYAKARTA

Oleh :
Hemalia Budiasti
114190027

INTISARI

Kegiatan sehari-hari masyarakat akan menghasilkan air limbah domestik yang berpotensi menyebabkan berbagai permasalahan lingkungan. Air limbah domestik mengandung beberapa zat pencemar, seperti TSS, COD,BOD, dan Amoniak. Apabila air limbah domestik langsung dialirkan ke badan air tanpa pengolahan, beban pencemar yang diterima oleh sungai akan tinggi, sehingga berpotensi menurunkan kualitas air sungai. Padukuhan Panasan, Kalurahan Triharjo, Kapanewon Sleman, Kabupaten Sleman, Provinsi Daerah Istimewa Yogyakarta sudah mempunyai tempat pengolahan air limbah domestik berupa Instalasi Pengolahan Air Limbah (IPAL) Komunal. Beberapa permasalahan pada IPAL komunal daerah penelitian, diantaranya pengguna melebihi kapasitas, scum yang tebal, dan belum dilakukan pengecekan kualitas efluen. Penelitian ini bertujuan untuk mengetahui kualitas influen dan efluen air limbah domestik IPAL komunal, menganalisis status mutu air Sungai Bedog setelah dialiri efluen air limbah domestik IPAL komunal ditinjau dari Indeks Pencemaran (IP) dan Standar Stream, menganalisis evaluasi kinerja IPAL komunal ditinjau dari kinerja tiap unit IPAL, serta merancang arahan pengelolaan untuk mengoptimalkan kinerja IPAL komunal.

Penelitian dilakukan menggunakan metode kuantitatif dan kualitatif. Metode kuantiatif yang digunakan, meliputi survey dan pemetaan, sampling, serta uji laboratorium. Pengambilan sampel dilakukan dengan metode purposive sampel. Metode kuantiatif berguna untuk mengetahui kualitas air limbah domestik dan air sungai. Parameter yang digunakan, diantaranya pH, suhu, TSS, COD,BOD, dan Amoniak. Metode kualitatif yang digunakan meliputi analisis perhitungan dan deskriptif. Metode kualitatif berguna untuk mengetahui status mutu air dengan metode Indeks Pencemaran (IP) dan parameter yang perlu diturunkan dengan metode Standar Stream. Metode evaluasi efisiensi kinerja unit IPAL komunal juga digunakan untuk mengetahui keoptimalan dalam mengolah air limbah domestik.

Hasil penelitian menunjukkan bahwa efluen air limbah domestik IPAL komunal sudah sesuai dengan baku mutu menurut Peraturan Menteri Lingkungan Hidup dan Kehutanan Nomor 68 Tahun 2016 tentang Air Limbah Domestik. Efluen yang sudah sesuai baku mutu masih berpotensi menambah beban pencemar pada sungai. Asumsi didasarkan pada status mutu air sungai setelah dialiri efluen menjadi tercemar ringan dengan nilai IP sebesar 3,7365. Standar stream juga menunjukkan adanya parameter yang perlu diturunkan. Parameter yang perlu ditutunkan, yaitu BOD 5,73 mg/L dan Amoniak 0,65 mg/L. Arahan pengelolaan yang digunakan untuk mengoptimalkan kinerja IPAL komunal ada dua pilihan, yaitu perancangan ulang IPAL komunal dan penambahan unit *constructed wetland*. Perancangan ulang IPAL komunal terdiri dari 4 unit, diantaranya bak equalisasi (1,6 m x 0,8 m x 3 m), bak pengendapan (1,6 m x 0,8 m x 3 m), *Anaerobic Baffle Reactor* (1,5 m x 1 m x 3 m) yang berjumlah 3 kompartemen, dan *Anaerobic Filter* (1,55 m x 1 m x 3 m) yang berjumlah 3 kompartemen dengan media sarang tawon. *Constructed wetland* (10,8 m x 5,4 m x 1,2 m) menggunakan media kerikil sedang dengan tanaman enceng gondok. Arahan pengelolaan bertujuan untuk tetap menjaga kualitas efluen sesuai baku mutu agar mengurangi beban pencemar yang diterima sungai.

Kata Kunci : IPAL komunal, Air limbah domestik, Indeks Pencemaran

EVALUATION AND OPTIMIZATION OF PERFORMANCE SEHAT LESTARI COMMUNAL INSTALLATION OF WASTEWATER TREATMENT (WWTP) IN PADUKUHAN PANASAN, KALURAHAN TRIHARJO, KAPANEWON SLEMAN, SLEMAN REGENCY, YOGYAKARTA SPECIAL REGION

By :
Hemalia Budiasti
114190027

ABSTRACT

People's daily activities will produce domestic wastewater which has the potential to cause various environmental problems. Domestic wastewater contains several contaminants, such as TSS, COD, BOD, and Ammonia. If domestic wastewater flows directly into river without treatment, the pollutant load received by the river will be high, this potentially reducing the quality of river water. Padukuhan Panasan, Kalurahan Triharjo, Kapanewon Sleman, Sleman Regency, Special Region of Yogyakarta already has a domestic wastewater treatment site in the form of a Communal Wastewater Treatment Plant (WWTP). Some of the problems in the communal WWTP in the study area, including users exceeding capacity, thick scum, and effluent quality checks have not been carried out. The purpose of this research to determine the influent and effluent quality of domestic wastewater from communal WWTPs, to analyze the water quality status of the Bedog River after being fed by domestic wastewater effluents from communal WWTPs in terms of Pollution Index (IP) and Stream Standards, to analyze the performance evaluation of communal WWTPs in terms of the performance of each unit, WWTP, and designing directives to optimize the performance of communal WWTP.

The research was conducted using quantitative and qualitative methods. The quantitative method used includes surveys mapping, sampling, and laboratory tests. Sampling was carried out using a purposive sample method. Quantitative methods are used to determine the quality of domestic wastewater and river water. Parameters used, including pH, temperature, TSS, COD, BOD, and Ammonia. The qualitative method used includes mathematical and descriptive analysis. Qualitative methods are used to determine the status of water quality using the Pollution Index (IP) method and the parameters that need to be derived using the Standard Stream method. The performance efficiency evaluation method of the communal WWTP unit is also used to determine the optimality in treating domestic wastewater.

The results showed that the effluent of domestic wastewater from the communal WWTP complies with the quality standards according to the Regulation of the Minister of Environment and Forestry Number 68 of 2016 concerning Domestic Wastewater. Effluent that meets quality standards has the potential to increase the pollutant load on the river. The assumption is based on the quality status of the river water after being fed by effluent to become lightly polluted with an IP value of 3.7365. Stream standards also indicate parameters that need to be derived. The parameters that need to be controlled are BOD 5.73 mg/L and Ammonia 0.65 mg/L. There are two management directions used to optimize the performance of the communal WWTP, that are the redesign of the communal WWTP and the constructed wetland. The redesign of the communal WWTP consists of 4 units, including equalization tanks (1,6 m x 0,8 m x 3 m), settling tanks (1,6 m x 0,8 m x 3 m), Anaerobic Baffle Reactor (1,5 m x 1 m x 3 m) totaling 3 compartments, and Anaerobic Filter (1,55 m x 1 m x 3 m) totaling 3 compartments with wasp nest media. Constructed wetland (10,8 m x 5,4 m x 1,2 m) using medium gravel media with water hyacinth plants. Management directives aim to maintain effluent quality according to quality standards. Effluent that complies with quality standards will reduce the pollutant load received by the river, so that the quality of river water is maintained. Management directives to maintain effluent quality according to quality standards, so that reduce the pollutant load received by the river.

Keywords: *Communal WWTP, domestic wastewater, Pollution Index*