

ABSTRAK

PENGARUH LIMBAH CAIR INDUSTRI TAHU TERHADAP STATUS MUTU AIR SUNGAI KALIKUNING KABUPATEN MAGELANG

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Industri tahu merupakan salah satu industri pangan yang menghasilkan limbah cair dengan kandungan bahan organik tinggi. Pembuangan limbah tanpa pengolahan dapat menurunkan kualitas air dan menimbulkan pencemaran pada badan air di sekitarnya. Penelitian ini bertujuan untuk menganalisis kualitas dan beban pencemaran efluen limbah cair dari salah satu industri tahu di Desa Paremono, menilai status mutu air Sungai Kalikuning akibat pembuangan limbah menggunakan metode Indeks Pencemaran (IP), serta merumuskan arahan pengelolaan limbah cair melalui perancangan Instalasi Pengolahan Air Limbah (IPAL) berdasarkan studi literatur dan jurnal terkait.

Penelitian menggunakan pendekatan deskriptif-kuantitatif dengan beberapa metode analisis, yaitu perhitungan Indeks Pencemaran (IP), metode stream untuk mengidentifikasi perubahan kualitas air sepanjang aliran sungai, serta metode standar effluent untuk membandingkan kualitas limbah cair dengan baku mutu. Pengambilan sampel dilakukan pada tiga titik pengamatan (LP 2, LP 3, dan LP 4) yang mewakili bagian hulu, tengah, dan hilir sungai. Parameter yang diuji meliputi BOD, COD, TSS, dan pH, dengan analisis laboratorium dan perbandingan terhadap baku mutu limbah cair industri tahu berdasarkan Peraturan Daerah Jawa Tengah Nomor 5 Tahun 2012. Hasil pengujian digunakan untuk menghitung beban pencemar dan menentukan status mutu air berdasarkan perhitungan IP.

Hasil penelitian menunjukkan bahwa efluen limbah cair industri tahu memiliki nilai BOD sebesar 635 mg/L, COD sebesar 1058 mg/L, dan TSS sebesar 240 mg/L, sehingga seluruhnya melebihi baku mutu. Nilai Indeks Pencemaran Sungai Kalikuning sebesar 0,50 pada LP 2 (baik), 4,16 pada LP 3 (tercemar sedang), dan 3,14 pada LP 4 (tercemar ringan), yang mengindikasikan adanya penurunan kualitas air akibat pembuangan limbah. Berdasarkan temuan tersebut, dirancang sistem IPAL yang terdiri dari bak ekualisasi, biofilter anaerob, biofilter aerob, dan sedimentasi akhir, dengan target penurunan BOD dan COD masing-masing sebesar 77% serta TSS sebesar 60%. Rancangan IPAL ini diharapkan mampu menghasilkan efluen yang memenuhi baku mutu kelas III dan mengurangi dampak pencemaran terhadap Sungai Kalikuning.

Kata kunci: Limbah Cair, Industri Tahu, Status Mutu Air, Indeks Pencemaran

ABSTRACT

ASSESSMENT OF THE IMPACT OF TOFU INDUSTRY WASTEWATER ON THE WATER QUALITY STATUS OF THE KALIKUNING RIVER, MAGELANG REGENCY

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The tofu industry is one of the food-processing industries that generates wastewater with a high organic content. Discharging untreated wastewater can degrade water quality and cause pollution in surrounding water bodies. This study aims to analyze the quality and pollution load of wastewater effluent from a tofu industry in Paremono Village, assess the water quality status of the Kalikuning River using the Pollution Index (PI) method, and formulate wastewater management measures through the design of a Wastewater Treatment Plant (WWTP) based on literature studies and relevant scientific references.

This research employed a descriptive-quantitative approach using several analytical methods, including the Pollution Index calculation, the stream method to identify changes in river water quality along the flow, and the effluent standard method to compare wastewater characteristics with regulatory limits. Sampling was conducted at three monitoring locations (LP 2, LP 3, and LP 4), representing upstream, middle, and downstream sections of the river. Laboratory analyses were performed for BOD, COD, TSS, and pH, the results were compared with the wastewater quality standards stipulated in Regional Regulation of Central Java No. 5 of 2012. The analytical results were then used to calculate pollution loads and determine water quality status using the PI formula.

The results showed that the tofu industry effluent contained BOD of 635 mg/L, COD of 1058 mg/L, and TSS of 240 mg/L, all of which exceeded the applicable standards. Pollution Index values for the Kalikuning River were 0.50 at LP 2 (good), 4.16 at LP 3 (moderately polluted), and 3.14 at LP 4 (lightly polluted), indicating that wastewater discharge significantly affected river water quality. Based on these findings, a WWTP system was proposed consisting of an equalization tank, anaerobic biofilter, aerobic biofilter, and final sedimentation, with target reductions of 77% for BOD, 77% for COD, and 60% for TSS. The proposed WWTP is expected to produce effluent that meets Class III water quality standards and reduce the pollution impact on the Kalikuning River.

Keywords: wastewater, tofu industry, water quality, pollution index