

PENGOLAHAN *GREYWATER* DAN AIR LIMBAH DARI KEGIATAN PEMELIHARAAN DENGAN MENGGUNAKAN *SUBSURFACE FLOW WETLAND* DI PT. X

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INTISARI

Central Processing Area (CPA) merupakan lokasi produksi minyak dan gas bumi di Desa Rahayu, Kecamatan Soko, Kabupaten Tuban, Provinsi Jawa Timur. Air limbah yang dihasilkan merupakan air buangan dari kegiatan pemeliharaan dan *greywater* yang di alirkan ke *see pond* CPA 2 menuju ke saluran irigasi. Terdapat beberapa keluhan dari warga sekitar tentang sawah yang tercemar akibat saluran irigasi yang digunakan sebagai satu-satunya sumber pengairan pada musim kemarau. Tujuan dilakukan penelitian ini untuk mengevaluasi kualitas air limbah di *see pond* CPA 2 dan saluran irigasi, mengevaluasi unit *see pond* CPA 2, menganalisis efektivitas percobaan *subsurface flow constructed wetland* (SSF), dan merancang serta merekomendasikan arahan pengelolaan berdasarkan percobaan SSF.

Dalam penelitian ini, metode yang digunakan adalah kuantitatif. Metode lainnya untuk mendukung penelitian kuantitatif mencakupi metode pengumpulan data dan survei rona lingkungan geofisik-kimia, biotis, sosial budaya, dan metode *purposive sampling* dalam pengambilan air sampel. Metode rancangan eksperimen *subsurface flow constructed wetland* skala laboratorium dilakukan berdasarkan dua kolam, yaitu kolam 1 (eceng gondok, pasir silika, zeolit) dan kolam 2 (eceng gondok, pasir silika, kerikil) dengan variasi waktu detensi 3 hari, 7 hari, dan 9 hari. Hasil pengujian kualitas air limbah pada *see pond* CPA 2 dan percobaan SSF dianalisis secara deskriptif.

Hasil pengujian pada titik sampel saluran air parameter TSS, TDS, dan TPH di atas baku mutu, *inlet* dan *outlet* parameter TDS, BOD₅, dan TPH di atas baku mutu serta saluran irigasi parameter BOD₅ dan TPH di atas baku mutu. Baku mutu yang digunakan adalah Peraturan Menteri Lingkungan Hidup dan Kehutanan Republik Indonesia Nomor 68 tahun 2016 tentang Baku Mutu Air Limbah Domestik, Peraturan Menteri Lingkungan Hidup Indonesia Nomor 5 Tahun 2014 tentang Baku Mutu Air Limbah, dan acuan jurnal Tehrani (2016). Berdasarkan percobaan yang dilakukan antara kedua kolam SSF skala laboratorium, kolam 1 (eceng gondok, pasir silika, zeolit) dengan waktu tinggal 9 hari memiliki efisiensi paling tinggi dibandingkan kolam 2 (eceng gondok, pasir silika, kerikil) dengan waktu tinggal 9 hari. Penurunan TSS sebesar 33,33%, TDS sebesar 39,52%, BOD₅ sebesar 39,3%, dan TPH sebesar 78,41%. Arahan pengelolaan yang direkomendasikan berdasarkan percobaan SSF berupa unit *subsurface flow constructed wetland* ukuran 8 m × 8 m × 1,5 m.

Kata Kunci: *Greywater*, Kegiatan Pemeliharaan, *Free Water Surface Constructed Wetland*, *Subsurface Constructed Wetland*

**GREYWATER AND WASTEWATER FROM MAINTENANCE ACTIVITIES
TREATMENT USING SUBSURFACE FLOW CONSTRUCTED
WETLAND AT PT. X**

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ABSTRACT

Central Processing Area (CPA) is an oil and gas production site in Rahayu Village, Soko Subdistrict, Tuban Regency, East Java Province. The wastewater generated is waste water from maintenance activities and graywater which is flowed into the CPA 2 see pond to the irrigation channel. There are several complaints from local residents about polluted rice fields due to irrigation channels that are used as the only source of irrigation during the dry season. The objectives of this study were to evaluate the quality of wastewater in the CPA 2 see pond and irrigation canals, evaluate the CPA 2 see pond unit, analyze the effectiveness of the subsurface flow constructed wetland (SSF) experiment, and design and recommend management directions based on the SSF experiment.

In this study, the method used was quantitative. Other methods to support the quantitative research included data collection methods and surveys of the geophysical-chemical, biotic, socio-cultural environment, and purposive sampling methods in sampling water. The laboratory-scale subsurface flow constructed wetland experimental design method was carried out based on two ponds, namely pond 1 (water hyacinth, silica sand, zeolite) and pond 2 (water hyacinth, silica sand, gravel) with variations in detention time of 3 days, 7 days, and 9 days. The results of wastewater quality testing in CPA pond 2 and SSF experiments were analyzed descriptively.

The test results at the sample point of the water channel TSS, TDS, and TPH parameters above the quality standard, inlet and outlet parameters TDS, BOD₅, and TPH above the quality standard and irrigation channels BOD₅ and TPH parameters above the quality standard. The quality standard used is the Regulation of the Minister of Environment and Forestry of the Republic of Indonesia Number 68 of 2016 concerning Domestic Wastewater Quality Standards, Regulation of the Minister of Environment of Indonesia Number 5 of 2014 concerning Wastewater Quality Standards, and Tehrani's journal reference (2016). Based on the experiment conducted between the two laboratory-scale SSF ponds, pond 1 (water hyacinth, silica sand, zeolite) with a residence time of 9 days has the highest efficiency compared to pond 2 (water hyacinth, silica sand, gravel) with a residence time of 9 days. The reduction of TSS was 33.33%, TDS was 39.52%, BOD₅ was 39.3%, and TPH was 78.41%. The recommended management direction based on the SSF experiment is a subsurface flow constructed wetland unit of 8 m × 8 m × 1.5 m in size.

Keywords: *Greywater, Maintenance Activities, Free Water Surface Constructed Wetland, Subsurface Constructed Wetland*