Simulasi pencemaran bakteri fecal coliform dan total coliform di DAS Citarum hulu menggunakan QUAL2Kw = Simulation of fecal coliform and total coliform bacterial pollution in the upper Citarum Watershed using QUAL2Kw

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Abstrak

DAS Citarum hulu termasuk ke dalam wilayah Perencanaan Sumberdaya Air Wilayah Sungai (PSDWS) sejak tahun 2016, yang berfungsi sebagai daerah tangkapan air utama dari Sungai Citarum. DAS Citarum hulu mengalami pengembangan secara pesat dan dimanfaatkan sebagai daerah pemukiman, pertanian, dan industri. Kondisi eksisting pada Sungai Citarum hulu memiliki konsentrasi fecal coliform dan total coliform yang berada dibawah baku mutu kelas II untuk fecal coliform 2000 MPN/100 ml dan total coliform 10000 MPN/100 ml. Penelitian ini bertujuan untuk mensimulasikan pencemaran bakteri fecal coliform dan total coliform di aliran sungai Citarum hulu menggunakan QUAL2Kw, mengevaluasi strategi Rencana Aksi Citarum Harum serta memberikan rekomendasi untuk mempertahankan dan meningkatkan kualitas di DAS Citarum Hulu menggunakan QUAL2Kw, dan menganalisis sensitivitas paramater permodelan pencemaran fecal coliform dan total coliform. Hasil simulasi konsentrasi fecal coliform dan total coliform belum memenuhi baku mutu sungai level II, diatas 2000 MPN/100 ml, dengan memiliki nilai eror sebesar 11802,412 fecal coliform dan 16656,663 total coliform. Hasil simulasi pada skenario Strategi Rencana Aksi Citarum Harum tidak efektif, karena hasil simulasi pada fecal coliform tidak memenuhi baku mutu dan total coliform pada segmen 1 – 10 belum memenuhi baku mutu, pada segmen 11 – 13 memenuhi baku mutu. Pada simulasi skenario II pada fecal coliform segmen 1 – 10 belum memenuhi dan pada segmen 11 – 13 memenuhi baku mutu, pada total coliform segmen 2 – 13 memenuhi baku mutu, tetapi pada segmen 1 belum memenuhi baku mutu dan sudah sangat mendekati baku mutu. Pada skenario III fecal coliform dan total coliform segmen Cirawa – Nanjung sudah berada dibawah baku mutu. Hasil dari analisis sensitivitas untuk konsentrasi fecal coliform dan total coliform, parameter sungai yang paling mempengaruhi pada Manning, Light Eff Factor pengurangan 5%, Bot Width pengurangan 5%, dan slope pengurangan 5%. Pada total coliform parameter sungai yang adalah Manning peningkatan 5% dan penurunan 5%, Bot Width pengurangan 5%, Pathogen Light Eff Factor pengurangan 5%, dan Bot Width peningkatan 5%.
.....The upstream of Citarum watershed has been included in the River Basin Water Resources Planning area since 2016, which functions as the main water catchment of ãâthe Citarum River. The upstream of Citarum watershed is experiencing rapid development and is used as a residential, agricultural and industrial area. Now, in the upstream of Citarum River have fecal coliform and total coliform concentrations which are below the class II based on PP No. 21 Tahun 2021, the standar number of fecal coliform are 2000 MPN/100 ml and total coliform are 10000 MPN/100 ml. This research aims to simulating fecal coliform and total coliform bacterial contamination in the upstream of Citarum river using QUAL2Kw, evaluating the Citarum Harum Action Plan strategy and providing recommendations to maintain and improve quality in the Upper Citarum watershed using QUAL2Kw, and analyze the sensitivity of the modeling parameters for fecal coliform and total coliform pollution. The simulation results of fecal coliform and total coliform concentrations not qualified based on the river quality standard level II on PP NO. 21 Tahun 2021 which is

above 2000 MPN/100 ml, with an error value of 11802.412 for fecal coliform and 16656.663 for total coliform. The simulation results in the Citarum Harum Action Plan Strategy scenario are not effective, because the simulation results on fecal coliforms not fullfil the quality standards and total coliforms in segments 1-10 also not fullfil the quality standards, but in segments 11-13 meet the quality standards. In scenario II simulation, fecal coliform segments 1-10 not fullfil the standard but in segments 11-13 the fecal coliform fullfil the standard, in total coliform segments 2-13 fullfil the quality standard, however in segment 1, it does not fullfil the quality standard but very close to the number of the quality standard. In scenario III, the fecal coliform and total coliform in the Cirawa – Nanjung segment are already below the quality standard. The results of the sensitivity analysis for the concentration of fecal coliform and total coliform, the river parameters that most influence for the results are Manning, Light Eff Factor with 5% reduction, Bot Width with 5% reduction, and slope with 5% reduction. Meanwhile, in total coliform river parameters the most influential parameters are the incretion of 5% Manning number and decretion 5% manning number, Bot Width with 5% reduction, Pathogen Light Eff Factor with 5% reduction, and Bot Width with 5% increation.