

## ABSTRAK

Pengolahan air oleh masyarakat sering dibuat seragam, tanpa memperhatikan kondisi kualitas air baku, sehingga menyebabkan tidak terpenuhinya efisiensi pengolahan karena kualitas air di setiap lokasi tidak selalu sama. Penelitian ini akan melakukan penentuan unit operasi dan proses pengolahan air bersih berdasarkan kualitas air baku yang bersumber dari Sungai Landak, serta anak sungainya yaitu Sungai Behe dan Sungai Dait. Kualitas air baku berasal dari beberapa data sekunder yang kemudian dianalisis dan ditentukan parameter yang melebihi baku mutunya. Berdasarkan PP No. 22 Tahun 2021 dan Permenkes No. 32 Tahun 2017, parameter yang melebihi baku mutu di ketiga sungai tersebut adalah pH, besi, mangan, kadmium, timbal, seng, TSS, dan *E.Coli*. Hal ini dikarenakan terdapat aktivitas penambangan emas, perkebunan kelapa sawit, penambangan pasir, dan pemukiman penduduk yang mencemari sungai. Selanjutnya berdasarkan parameter tersebut, dibuat sebuah tabel penyisihan untuk mengeliminasi unit pengolahan yang mengacu pada Tabel Alternatif Pengolahan Air oleh SNI 7508: 2011 dan Teknologi Pengolahan Terbaik (*Best Available Technology*) oleh US EPA. Ada tiga alternatif kombinasi unit operasi dan proses yang diusulkan yaitu alternatif pertama yang terdiri dari intake, penambahan basa, prekhlorinasi, sedimentasi, filtrasi (*ion exchange*), khlorinasi, dan reservoir; Alternatif kedua yang terdiri dari intake, penambahan basa, koagulasi, flokulasi, sedimentasi, filtrasi, desinfeksi, dan reservoir; Serta alternatif ketiga yang terdiri dari intake, penambahan basa, khlorinasi, sedimentasi, filtrasi (adsorpsi), dan reservoir. Alternatif tersebut dianalisis dengan menggunakan metode *Simple Additive Weighting* (SAW) untuk menentukan kombinasi unit operasi dan proses yang paling efektif dan efisien. Berdasarkan hasil penilaian dengan metode SAW, didapatkan bahwa alternatif kedua merupakan kombinasi unit operasi dan proses terpilih.

**Kata Kunci:** Alternatif unit operasi dan proses, kualitas air, pengolahan air bersih, *Simple Additive Weighting*.

## ***ABSTRACT***

Water treatment by the community is often made uniform without paying attention to the condition of raw water quality, thus causing treatment efficiency to not be fulfilled because the water quality in each location is not always the same. This study will determine the operation unit and clean water treatment process based on the quality of raw water sourced from the Landak River and its tributaries, namely the Behe River and the Dait River. Raw water quality comes from some secondary data, which is then analyzed and determined to have parameters that exceed the quality standard. Based on PP No. 22 of 2021 and Permenkes No. 32 of 2017, the parameters that exceed the quality standards in the three rivers are pH, iron, manganese, cadmium, lead, zinc, TSS, and E. coli. This is because there are gold mining activities, oil palm plantations, sand mining, and residential areas that pollute the river. Furthermore, based on these parameters, an allowance table is made to eliminate the treatment unit, which refers to the Water Treatment Alternative Table by SNI 7508: 2011 and the Best Available Technology by the US EPA. The three alternative combinations of operating units and processes are proposed, namely the first alternative consisting of intake, addition of base, prechlorination, sedimentation, filtration (ion exchange), chlorination, and reservoir; the second alternative consists of intake, addition of base, coagulation, flocculation, sedimentation, filtration, disinfection, and reservoir; and the third alternative, which consists of intake, addition of base, chlorination, sedimentation, filtration (adsorption), and reservoir. The alternatives were analyzed using the Simple Additive Weighting (SAW) method to determine the most effective and efficient combination of unit operations and processes. Based on the results of the assessment using the SAW method, it was found that the second alternative is a combination of the selected operating unit and process.

**Keywords:** Alternative unit operations and processes, clean water treatment, and Simple Additive Weighting, water quality.