

## PENGARUH VARIABILITAS CURAH HUJAN TERHADAP KUALITAS AIR DI SUNGAI SUMURUP, KABUPATEN GUNUNGKIDUL

Oleh  
Iqbal Nugraha  
17/414268/GE/08615

### INTISARI

Sungai Sumurup merupakan sungai alogenik yang secara administratif terletak di Kecamatan Wonosari, Kabupaten Gunungkidul. Sebagai salah satu sungai yang mengimbuhi Karst Gunungsewu, perlu dilakukan pengelolaan khususnya sumberdaya air sungai dengan mengetahui kondisi kualitas air untuk mengetahui kondisi pencemaran dan pengaruh hujan terhadap kualitas air di Sungai Sumurup. Penelitian ini dilakukan dengan tujuan untuk: (1) menganalisis kualitas air parameter  $\text{PO}_4$ ,  $\text{NO}_3^-$ ,  $\text{SO}_4^{2-}$ ,  $\text{Cl}^-$ , pH, suhu, TDS, DHL, dan *total coliform*; (2) Menentukan status mutu air Sungai Sumurup dengan metode STORET; dan (3) menganalisis hubungan curah hujan terhadap kualitas air parameter fosfat, nitrat, dan sulfat di Sungai Sumurup, Kabupaten Gunungkidul.

Penelitian ini menggunakan data primer yang dilakukan dengan pengumpulan data selama 8 bulan dari Mei 2021–Januari 2022. Pengambilan data kualitas air bulanan dilakukan secara manual sebanyak 10 sampel dan pengambilan sampel kejadian hujan menggunakan *automatic water sampler* dilakukan 1 kali kejadian hujan sebanyak 12 sampel. Sampel tersebut kemudian diuji di laboratorium. Parameter yang diuji yaitu fosfat, nitrat, sulfat, klorida, *total coliform*, pH, suhu, TDS dan DHL. Parameter yang diuji untuk sampel kejadian hujan yaitu fosfat, nitrat, dan sulfat. Pengolahan data parameter kualitas air tersebut menghasilkan kondisi kualitas air dan status mutu air yang dihitung menggunakan metode STORET. Alat pencatat tinggi muka air (TMA) berupa *logger* dipasang di lokasi penelitian dengan interval pencatatan setiap 15 menit. Data TMA diolah menghasilkan hidrograf aliran berupa debit untuk selanjutnya dikorelasikan dengan kualitas air. Curah hujan dicatat menggunakan alat *weather station* dengan interval 15 menit. Data debit dan tebal hujan dikorelasikan dengan data kualitas air menggunakan *cross-correlation*.

Hasil penelitian menunjukkan bahwa parameter fosfat dan *total coliform* cenderung melebihi baku mutu air kelas I dan II berdasarkan Pergub DIY nomor 20 tahun 2008 tentang Baku Mutu Air di Provinsi DIY. Status mutu air di Sungai Sumurup termasuk kedalam kelas C atau diklasifikasikan sebagai cemar sedang dengan nilai total -8 untuk parameter fosfat dan -12 untuk parameter *total coliform*. Perhitungan status mutu air tersebut membandingkan hasil pengujian parameter  $\text{PO}_4$ ,  $\text{NO}_3^-$ , dan  $\text{SO}_4^{2-}$  di laboratorium yang dibandingkan dengan baku mutu air kelas II berdasarkan Pergub DIY nomor 20 tahun 2008 tentang Baku Mutu Air di Provinsi DIY. Nilai *cross-correlation* tebal hujan-fosfat, tebal hujan nitrat, dan tebal hujan-sulfat secara berturut-turut adalah (-0,487), (0,739), dan (-0,754) dengan  $T_{\text{lag}}$  selama 1 jam. Nilai *cross-correlation* debit-fosfat dan debit-sulfat secara berturut-turut adalah (-0,387) dan (-0,519) dengan  $T_{\text{lag}}$  Selama 3 jam. Nilai *cross-correlation* debit-nitrat adalah sebesar (0,852) dengan  $T_{\text{lag}}$  selama 2 jam. Hubungan tebal hujan dan debit dengan kualitas air menunjukkan bahwa parameter fosfat dan sulfat mengalami pengenceran, sementara parameter nitrat mengalami pemekatan.

**Kata Kunci:** Kualitas Air, STORET, Cross-correlation.

## THE IMPACT OF RAINFALL VARIABILITY ON WATER QUALITY IN THE SUMURUP RIVER, GUNUNGKIDUL REGENCY

By

Iqbal Nugraha

17/414268/GE/08615

### ABSTRACT

*The allogenic river Sumurup located in Wonosari District, Gunungkidul Regency. As one of the contributing rivers to the Gunungsewu Karst, it is necessary to manage its water resources by quality monitoring, such as the conditions of pollutants and the effect of rain on water quality. This research was conducted with objectives: (1) to analyze the water quality parameters of  $PO_4$ ,  $NO_3^-$ ,  $SO_4^{2-}$ ,  $Cl^-$ , pH, temperature, TDS, DHL, and total coliform; (2) to determine the water quality status of the Sumurup River using the STORET method; and (3) to analyze the correlation between rainfall and water quality parameters of phosphate, nitrate, and sulfate in the Sumurup River, Gunungkidul Regency.*

*This study used primary data for 8 months from May 2021 to January 2022. Ten samples of monthly water quality were collected manually and hourly samples of rain events using an automatic water sampler and then were tested in the laboratory. Water quality parameters tested were  $PO_4$ ,  $NO_3^-$ ,  $SO_4^{2-}$ ,  $Cl^-$ , total coliform, pH, temperature, TDS, and EC. Parameters tested for samples of rain events were phosphate, nitrate, and sulfate. The data processing turn out water quality conditions and water quality status which were calculated using the STORET method. A logger was installed at the research site with a recording interval of 15 minutes. A water-level data were processed to produce a flow hydrograph of discharge to further correlate with water quality. Rainfall was recorded using a weather station at 15-minute intervals. Rain discharge and thickness data were analyzed with water quality data using cross-correlation.*

*The results showed that the phosphate and total coliform parameters tended to exceed the water quality standards for classes I and II according the Governor of the Special Region of Yogyakarta Regulation No. 20 of 2008 concerning Water Quality standards in the Special Region of Yogyakarta Province. The status of water quality in the Sumurup River was classified as class C or moderately polluted with a total value of (-8) for the phosphate parameter and (-12) for the total coliform parameter. The water quality status comparison to the results of testing the parameters of  $PO_4$ ,  $NO_3^-$ , and  $SO_4^{2-}$  in the laboratory was classified as class II quality standards based on the Governor of Special Region of Yogyakarta Regulation No. 20 of 2008 concerning Water Quality Standards in the Special Region of Yogyakarta Province. The cross-correlation values of rain compared to phosphate, nitrate, and sulfate were (-0,487), (0,739), and (-0,754) with an hour lag. The cross-correlation values of water discharge compared to phosphate and sulfate were (-0,387) and (-0,519) with 3 hours lag. The cross-correlation value of water discharge compared to nitrate was (0,852) with 2 hours lag. The correlation between rainfall and discharge with water quality indicated that the phosphate and sulfate parameters experienced dilution, while the nitrate parameter became concentrated.*

**Keywords:** Water Quality, STORET, Cross-correlation