ABSTRAK

Melimpahnya jumlah sedimen yang masuk pada sistem fluvial dapat menyebabkan terjadinya perubahan dan gangguan geomorfik. Kali Putih merupakan sungai yang terdampak dan terganggu oleh input material volkaniklastik. Tercatat sekitar 55 kejadian lahar terjadi di Kali Putih atau sekitar 20 % dari seluruh kejadian lahar di Gunungapi Merapi. Penelitian ini bertujuan untuk: (1) menganalisis perubahan morfologi sungai akibat adanya input material volkaniklastik pasca erupsi Gunungapi Merapi 2010 di Kali Putih dan (2) menganalisis perubahan geomorfologi sungai akibat adanya input material volkaniklastik pasca erupsi Gunungapi Merapi 2010 di Kali Putih.

Data topografi (Alos 2008 dan LiDAR 2012) dan citra satelit/foto udara (citra Quickbird tahun 2006 dan foto udara tahun 2012) digunakan untuk analisis perubahan morfologi sungai dan geomorfologi sungai. Parameter geometri sungai yang digunakan meliputi elevasi dasar sungai, lebar sungai, kemiringan sungai (*channell gradient*), indeks teranyam (*braiding index)* dan derajat meander (*sinousity).* Identifikasi dan analisis perubahan geomorfologi sungai dilakukan dengan analisis pemetaan geomorfologi alur sungai, analisis imbangan sedimen, analisis karakteristik ukuran butir dan analisis geomorfometri alur sungai.

Hasil penelitian menunjukkan bahwa input material volkaniklastik kondisi morfologi sungai mengalami perubahan kondisi morfologi sungai mengalami perubahan. Kali Putih mengalami peningkatan pengikisan dasar sungai, lebar sungai, derajat meander, dan indeks teranyam. Parameter yang mengalami penurunan hanya kemiringan sungai meskipun pada beberapa tempat ditemui peningkatan nilai kemiringan sungai. Input material volkaniklastik juga menyebabkan terjadinya pergerakan sedimen sebanyak 7.139.549 m^3 dan menghasilkan nilai ketidakseimbangan (*imbalance*) sebesar 28 % dengan proses yang mendominasi adalah degradasional. Material volkaniklastik bergerak di sepanjang Kali Putih, 39 % disuplai dari erosi tebing sungai, 25,6 % dari erosi pada gosong sungai dan 6,6 % dari erosi dasar sungai. Proses geomorfologi baik erosi maupun deposisi berkebalikan dengan kondisi sungai secara alami dikarenakan adanya intervensi manusia berupa bangunan pengendali sedimen atau sabodam. Seharusnya bagian medial didominasi oleh proses erosi dan bagian distal didominasi oleh proses sedimentasi, namun kenyaataanya proses deposisi dominan di daerah medial dan erosi di daerah distal. Pola penghalusan ukuran butir dominasi oleh deposisi selektif dan suplai sedimen. Secara geomorfometri, nilai rata-rata kemiringan lereng dan kekasaran permukaan alur sungai meningkat sesudah input material volkaniklastik. Meskipun input material volkaniklastik besar, kondisi kondisi arah hadap lereng tidak berubah secara signifikan. *General Curvature, Plan Curvature* dan *Profile Curvature* mengalami fluktuasi perubahan cembung-cekung yang tinggi.

Kata kunci: material volkaniklastik, gangguan geomorfik, imbangan sedimen, perubahan morfologi sungai, perubahan geomorfologi sungai, Kali Putih, Merapi, Indonesia

ABSTRACT

The abundance of sediment entering the fluvial system can cause geomorphic disturbance. Disruption of the fluvial system will lead to the adjustment process either vertically or laterally. Kali Putih is the most river that has been affected and disturbed by the abundance of volcaniclastic material after 2010 Merapi Volcano Eruption. About 55 lahar events occurred in Kali Putih, or about 20% of all events at Merapi Volcano. The purposes of this study are (1) to analyze river morphology change due to volcaniclastic material input after 2010 Merapi Volcano eruption in Kali Putih and (2) to analyze geomorphology change due to volcaniclastic material input after 2010 Merapi Volcano eruption in Kali Putih.

Topographic data (Alos 2008 and LiDAR 2012) and satellite imagery/aerial photograph (Quickbird imagery 2006 and aerial photographs 2012) were used to analyze changes in river morphology and geomorphology. Parameters used for analyzing river morphology changes are riverbed elevation, river width, channell gradient, braiding index and meander degree. Identification and analysis of river geomorphology changes were carried out by geomorphological mapping, sediment budget analysis, grain size analysis, and geomorphometric analysis.

The results showed that the input of volcaniclastic material is responsible for changing river conditions through morphological and geomorphological changes. Some parameters such as riverbed erosion, river width, sinousity ratio and braiding index increase after volcaniclastic material input. Channell gradient values is the only parameter that do not increase after input of volcaniclastic material although at some point encountered an increase in value. The input of volcaniclastic material also causes sediment movement as much as 7.139.549 m^3. Sediment budget calculation indicates that Kali Putih has 28% imbalance value with degradation as dominant process. Sediment movement in Kali Putih is supplied by river bank erosion (39%), erosion on bar (25,6%) and riverbed erosion (6,6%). Geomorphological processes either erosion or deposition is in contrast different to the natural river conditions due to human intervention in the form of sediment control structures or sabodam. Supposedly, the upstream should be dominated by erosion process and downstream should be dominated by deposision process, but in this river, deposition process is dominant in the upstream and erosion is dominant in the downstream. The pattern of grain size downstream fining is caused by selective deposition and sediment supply. Geomorphometrically, the average value of slope and surface roughness increases after volcaniclastic material input. Aspect conditions did not change significantly. General Curvature, Plan Curvature and Profile Curvature have high convex-concave fluctuation.

***Keywords**: volcaniclastic material, geomorphic disturbances, sediment budget, river morphology change, river geomorphology change, Kali Putih, Merapi, Indonesia*