CHAPTER 5
CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

Based on the results obtained from the analysis in this study, several conclusions can be achieved, such as:

1. Calibration result of upper Cikapundung catchment area model in year 1994 have a bell-shaped rainfall time-distribution with 7-hour duration hourly rainfall 0.37%, 5.26%, 30.17%, 37.66%, 22.19%, 3.99%, and 0.25% in order. The computed hydrograph has quite resembled the observed hydrograph.
2. The rainfall time-distribution in Bandung tends to have a shorter duration over the past few years. Even so, the calibrated model of upper Cikapundung catchment area uses 7-hour duration since it results a more similar hydrograph with the observed hydrograph compared to other rainfall durations. But, generally, lots of storm events occur in shorter duration throughout the years. For Station Bandung, the rainfall time-distribution has an 8-hour duration rainfall (dominant rainfall duration).
3. From 3 scenarios of Bandung time-distribution (Type A, B, and C), not all of them results in hydrograph that can be compared with other time-distributions. Type-A and C Bandung time-distribution have double-peak rainfall mass weight resulting a double-peak hydrograph as well. So, type-B Bandung time-distribution is more compatible to be applied in upper Cikapundung catchment area. The hourly rainfall mass weight is 3.61%, 1.7%, 5.2%, 5.3%, 15.8%, 47.93%, 16.65%, and 3.82% respectively.
4. By comparing Type-B Bandung time-distribution with other time-distributions, SCS type III time-distribution results in a more similar mass curve and outflow hydrograph. SCS type III time-distribution has the smallest difference in peak hydrograph and time-to-peak.

5. If flood design computation uses time-distribution from the alternative ones (Wanny, Tadashi, Huff, PSA, and SCS), it should be noted that it will result in a lower peak hydrograph and time-to-peak for this catchment area.
6. For this catchment area, a 5-hour duration of rainfall time-distribution will result in a greater peak hydrograph. But there's no similar alternative time-distributions with this rainfall time-distribution.

5.2 Recommendations

Considering the results in analysis and conclusion obtained, further consideration is necessary to result a better quality of this study, such as:

1. An hourly rainfall recording stations should be available more in some regions, especially those who tend to have heavy storm events, such as Java Island. Accordingly, flood discharge computation can be done using the available real-time rainfall time-distribution data.
2. As an alternative to the absence of rainfall time-distribution, SCS type III time-distribution can be applied for upper Cikapundung catchment area. Even so, it should be noted that it will result in lower peak hydrograph and shorter time to peak duration. In accordance to that, SCS type III time-distribution still needs duration of rainfall since it can be applied for any duration. For this case, the 8-hour rainfall duration is chosen.
3. Latest data of observed discharge at Pos Gandok in upper Cikapundung catchment area is needed to result in better calibrated model.
4. A more detailed land use data and river characteristic is needed to enhance the calibrated model.

REFERENCE

Agustin, Winda. (2010), Pola Distribusi Hujan Jam-Jaman di DAS Keduang, *Skripsi*. Fakultas Teknik, Jurusan Teknik Sipil, Universitas Sebelas Maret.

Badan Standardisasi Nasional. (2016). SNI 2415-2016 Tata Cara Perhitungan Debit Banjir Rencana.

Chow, Ven Te, Madiment, David R., dan Mays, Larry W. (1998). *Applied Hidrology*. United States: McGraw-Hill.

Departemen Pekerjaan Umum Republik Indonesia. (1985). Dokumen Pedoman Perkiraan Banjir untuk Perencanaan.

Ellida N., "Pola Agihan Hujan dan Pengaruhnya terhadap Banjir Rancangan", Tesis Magister Pengelolaan Bencana Alam, Program Pascasarjana FT UGM, 2012.

Huff, F.A., (1990). *Time Distributions of Heavy Rainstorms in Illinois*. Illinois State Water Survey Champaign, Circular 173.

Rismana, G.A. dan Firmansyah (2011), "Evaluasi Pemanfaatan Ruang Berdasarkan Indeks Konservasi di Sub DAS Cikapundung Hulu Provinsi Jawa Barat", Jurnal Lingkungan dan Bencana Geologi, Vol.2, No.1, 49-66.

Soewarno. (1995). Hidrologi Aplikasi Metode Statistik untuk Analisa Data. Penerbit Nova, Bandung.

Sosrodarsono, S. dan Takeda, K. (1978). Hidrologi untuk Pengairan, Edisi ke-2. PT. PERMAS, Jakarta.

Sumarauw, Jeffry S.F. (2016), Pola Distribusi Hujan Jam-Jaman Daerah Minahasa Selatan dan Tenggara, Jurnal Sipil Statik, Vol. 4, No. 11 November 2016, 675-686

Suripin. (2004). Sistem Drainase Perkotaan yang Berkelanjutan. Yogyakarta: ANDI.

Triatmodjo, B., (2008). Hidrologi Terapan. Beta Offset, Yogyakarta.

United States Department of Agriculture – Natural Resources Conservation Service, 1986. *Urban Hidrology for Small Watersheds*, TR 55. June.

Wangsaatmaja, S., (2004). Perubahan Tata Guna Lahan terhadap Rezim Aliran Air dan Sanitasi Lingkungan. *Tesis*. Institut Teknologi Bandung, Bandung.

Wibowo, Mardi. (2005), "Analisis Pengaruh Perubahan Penggunaan Lahan Terhadap Debit Sungai (Studi Kasus Sub-DAS Cikapundung Gandok, Bandung)", Jurnal Teknik Lingkungan, P3TL-BPPT, 6 (1): 283-290