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Automatic Observation Of "Diver" And Pumping Of Longstorage Banger Semarang City Indonesia

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ABSTRACT— Floods that occur on the north coast of Central Java are caused by high rainfall and the presence of ROB including floods that occur in the Catchment area of the Semarang city banger, where there is high rainfall, where when there is high rain, water flows from upstream to downstream carrying waste material. In the form of used bottles, plastics, tree branches, leaves and other rubbish in the presence of this garbage will disrupt and inhibit the flow of water, which both happens in the longstrage banger and in channel A2. Semarang by optimizing longstorage. To find out the water level in the longstorage the method is to install a peil schal or measuring meter in the long storage banger in addition to installing a Diver device that is paired with the peil schal tool if the water has reached a certain elevation according to the stipulated provisions, the water in Longstorage banger then the pump is discharged into the BKT river in Semarang City. Based on the results of measurements and field observations, when it rains in the Banger cathment area, it is directly proportional to the observation using the Diver tool and is juxtaposed with the observation results at the nearest rainfall station, namely BMKG maritin. Observation and installation of tools were carried out on 24 February to 5 March 2020 based on observations and reading data on your maximum elevation diver on 24 and 25 February 2020 while based on daily and hourly rainfall data obtained from BMKG, Maritime Station, the rainfall intensity is 25 mm. and the flood discharge is 34 m^3/s and the water level in the Banger longstorage is 0.8 m, based on these data, it is a straight line with good observation using the Diver tool and with the data obtained at the bulk station.

KEYWORDS: Elevation, Longstorage, Diver

1. INTRODUCTION

Floods that occur on the north coast of Central Java are caused by high rainfall and the presence of ROB including floods that occur in the Catchment area of the Semarang city banger, where there is high rainfall, where when there is high rain, water flows from upstream to downstream carrying waste. In the form of used bottles, plastics, tree branches, leaves and other rubbish in the presence of this garbage will disrupt and inhibit the flow of water, which both happens in the longstrage banger and in channel A2. Semarang by optimizing longstorage. The existing condition of the land elevation which is lower than the sea level causes a greater rate of subsidence. Rob floods in Semarang cause damage to roads, housing, sanitation and other infrastructure besides that it will also have an impact on people's lives, especially those who are directly affected by the flood [1], [2]. These problems were caused by tidal flooding and land subsidence on the north coast of Central Java. The objectives of the study were: To measure the elevation of water discharge in the Banger port, to determine the Hydrological Characteristics in the Catchment Area Banger. Meanwhile, there are three approaches to preventing floods in the city of Semarang, namely. Control of floods coming from the watershed in upstream, local flood control, and control of floods due to tides or tides [3] According to, floods in the city of Semarang are caused by physical and non-physical conditions. The first factor is the geographical condition of the city of Semarang which has potential flood areas, because there are areas that are located in high areas and areas that are located in lowland areas, causing flooding of shipments originating from the southern region of Semarang City and Semarang Regency [4].

In addition, many rivers that originate in the Semarang Regency area pass through Semarang City. The second factor is that the change in land use from rubber forest to housing in the Mijen sub-district has increased the damage in the area. The third factor, the existence of hillside flushing in several places resulted in changes in water flow patterns, erosion, and increased water velocity, thus burdening irrigation. The fourth factor, construction of illegal houses on riverbanks, construction of ponds that narrows the river and closure of channels in downstream areas. The fifth factor is non-technical problems, namely the bad behavior of the people of Semarang city. Community behavior that does not care about environmental maintenance such as throwing garbage in drains and random places and closing drainage channels for buildings / stalls is common [5]. In addition, the factors of high tides and land subsidence are the main threats in Semarang City [6], [7]. Basically, land subsidence is the change (deformation) of the land surface vertically downwards from a high reference plane [8]. The drainage system is considered as an effective and efficient alternative to overcoming flood and tidal problems in the Tawang Sari and Tawang Mas areas which has a gentle topography. This drainage system planning includes planning long storage, pump house, embankment and floodgates [9].

2. Method

The research method used is quantitative research in accordance with the conditions in the field. The data used consists of polder area data, drainage channel capacity, and pump capacity, while other data sourced from related agencies and have carried out measurements consist of: Rain Data, using reference to Tanjung Mas Maritime Rain Station Topographic data, using maps RBI topography (Rupa Bumi Indonesia), Land Use Data, refers to Perda No. 5/2004 concerning Semarang City Spatial Planning (RTRW) 2000-2010, drainage network system data, land subsidence data and tidal data, using references from Tanjung Mas Maritime Rain Station [10].

3. Research Location

The elevation view of Longstorage Banger, as can be seen in Figure 1 [11].

Figure 1. Observation Location of Longstorage Banger Elevation

4. Result

4.1 Record of Water Level

For the purposes of calibrating data on rainfall and runoff (discharge / river water level), observations of Water Level were carried out in the Banger River on February 9, 2020 to March 5, 2020. Untuk keperluan kalibrasi data rainfall dan runoff (Discharge / river water level). Water Level observations use the Diver and Peil Schaal tools as shown in Figure 2. Diver, an instrument designed to measure the level and temperature of

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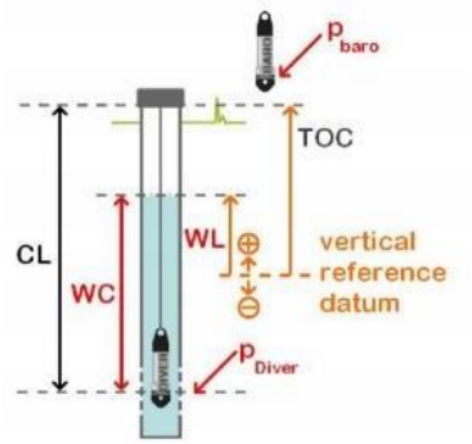
groundwater. Diver is designed to measure the pressure and temperature of water; from the pressure data it is then converted to a formula to get the water level [12].



Sumber: Schlumberger Water Services, 2014

Figure 2. Diver

4.2 Field Observation Result

The Graph in Figure 3, it can be seen that the increasing trend of water level is accompanied by an increase in rainfall. It can be concluded that the trend of rainfall recording at Tanjung Emas Station is linear with the trend of recording the water level on the Banger River. In the graph below where Figure 3 shows the Rain Intensity notation in order from big to small

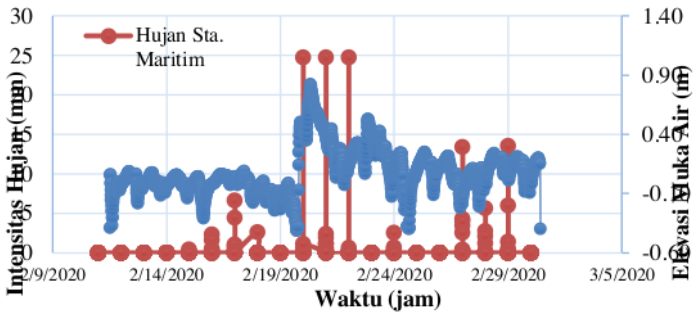


Figure 3. Calibration of Rainfall Data for Sta. Maritime and water level Banger river

In the graphic image above it can be seen that the recording of the highest water level is at an elevation of 0.81 m and the lowest is at an elevation of -0.41 m based on observations on a measuring tub / peilschaal with a riverbed elevation at -0.60 m The recording of the water level using the diver must also be compared with the water level data when the pump is activated. The comparison was carried out on February 20, 2020 to February 24, 2020 to see the trend of the two data, in order for the units to be the same, the TMA recording data using the Diver is converted into hours. So that both data have the same unit. The trend of the diver's TMA and the pump's TMA shows a similar trend. The TMA elevation of the Banger Pump is adjusted to the elevation of the peilschaal riverbed, the measurement of the diver, which is -0.60 m

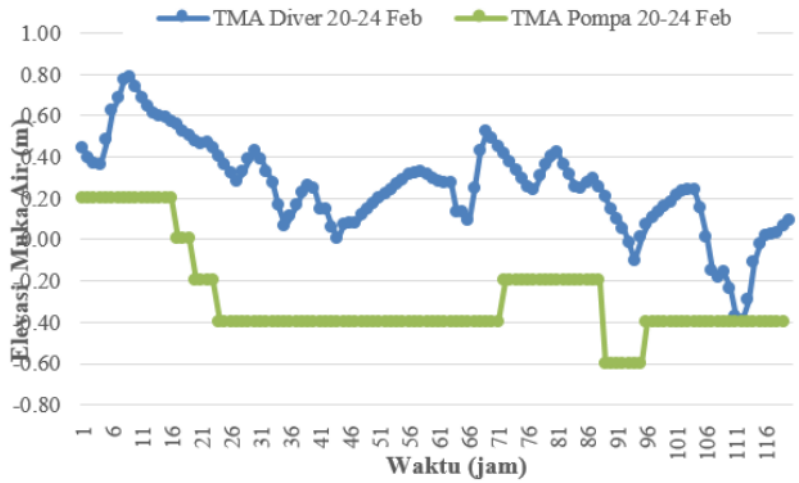


Figure 4. Comparison of TMA Diver and TMA for the Banger River Pump

The water level data observed using the diver is then converted into discharge and then juxtaposed with rain data and Banger Pump discharge records for the time span of 20 February 2020 to 24 February 2020. The TMA conversion to discharge was carried out using the Manning approach with known variables in the field based on previous studies. In the graph below, it can be seen that the Rain and Discharge trends show relatively similar trends, even though the magnitudes are different.

The peak discharge that occurred was 33.0 m^3/s which occurred on February 21, 2020. Figure 5 shows the notation of Rain Intensity from large to small prices

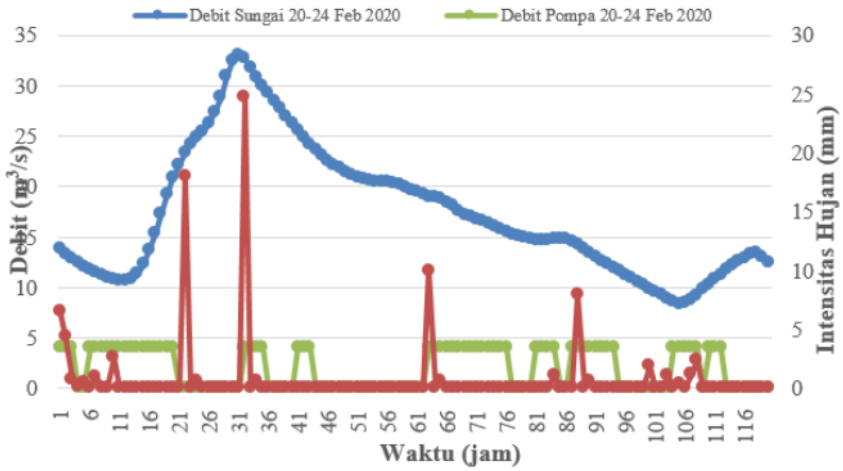


Figure 5. Comparison of Rain Data Sta. Maritime and Banger River Discharge Rain Intensity from Big to Small

The following is an explanation of Figure 5 which is shown in Table 2. The number of pumps at the Banger Pump Station is 5 (five) with a capacity of 2 m^3/s each. The pump that is turned on is 2 (two) alternately at certain hours according to the existing

Table 2. Comparison of Banger River Discharge, Pump Discharge, and Rainfall Recording Sta. Maritime

Date	Hour	Hour to-	Rain Intensity (mm)	Discharge /Q (m^3/s)		Number of lifed Pumps
				Banger River	Banger Pump	
20/02/2020	1	1	6.6	13.84	5	2
21/02/2020	6	30	0	32.40	5	0
22/02/2020	15	63	24.7	18.99	5	2
23/02/2020	16	88	24.7	14.25	5	2
24/02/2020	17	113	24.7	11.76	5	2

Sumber: Analisis, 2019

Based on comparison data between elevation measurements with diver and rainfall analysis at the Semarang maritime station with the same time parameters, the elevation data is -0.8 m and rainfall intensity of 25 mm so between rainfall intensity and elevation are proportional to straight

5. Conclusion

The tidal flood control system in the Banger watershed, with the concept of isolating the flow of sea water and controlling the water level with pumps, channels, ponds, embankments. Based on the results of measurements and field observations, when it rains in the Banger watershed, the results are directly proportional to observations using tools Diver and juxtaposed with observations at the BMKG Maritime Rainfall Station and installation of tools were carried out on 24 February to 5 March 2020. Based on observations and reading data, maximum elevation diver on 24 and 25 February 2020, Meanwhile, based on daily and hourly rainfall data obtained from BMKG Maritime Station, the maximum rainfall is 25 mm in intensity and the flood discharge is 34 m3/s. with the water level in the longstorage banger 0.8 m, so based on the data it is a straight line with good observation using the Diver tool and with the data obtained at the bulk station

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