ANALYSIS OF WATER LOSS ON SETTLEMENT RIVERBANKS OF KARANG MUMUS OF SAMARINDA CITY

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Abstract- Changes in land use, which could lead to further shrinking of water catchment areas and the reduced ability of soil to absorb rainwater. Changes functioning land and rivers of green open space that serves to accommodate the rain water into the region awakened a phenomenon that often occurs in urban areas, including of Samarinda City. Changes in land use in settlements along the river it increases the rate of runoff that occurs. Water losses are generally divided into two categories, among others: (1) loss of physical effects which water loss occurs because of water seepage in drainage and percolation; and (2) Loss due to pelimpasan and excess water disposal in the drainage. The aim of this study was to analyze the amount of water lost in space settlements along the riverbanks ofKarang Mumus of Samarinda City. The study was conducted on space settlements along the riverbanks of Karang Mumus of Samarinda City.

Keyword- Lost Water, Settlements, the River Plate.

I. INTRODUCTION

The urban development is a logical consequence of the process of urbanization. Population growth is continuous spatial serious consequences for the life of the city, namely the demand for space in order to meet the needs of residential, residential or trade and services. Distribution of building an uncontrolled impact on flood plains region with the onset of the buildings in the area along the river. Plus, with the high price of urban land and with the weakness of the economies of most communities, forcing residents to utilize vacant land as flood plains areas by building settlements. Changes in land use, which could lead to further shrinking of water catchment areas and the reduced ability of soil to absorb rainwater. Changes functioning land and rivers of green open space that serves to accommodate the rain water into the region awakened a phenomenon that often occurs in urban areas, including the city of Samarinda. Changes in land use in settlements along the river it increases the rate of runoff that occurs.

The problem that occurs is the utilization of space in the riverbank Karang Mumus Samarinda had increased uncontrolled use of undeveloped land in the form of density, resulting in a degradation of the quality of the urban environment in the area Karang Mumus riverbank. With the emergence of slums, especially in areas along the river that have an impact on water loss on settlements along the riverbanks ofKarang Mumus of Samarinda City. The aim of this study was to analyze the amount of water lost in space settlements along the riverbanks ofKarang Mumus of Samarinda City.

II. THEORITICAL REVIEW

A. Identification of Land Use

Definition of identification according to the Dictionary of Indonesian (in Chalsie Janny, 2013) is the determinant or the determination of a person's identity, objects, etc. Land use is a land use and land arrangement made in accordance with existing kodisi nature. Land use is one of the problems of the current land use. Land use is changing the function of some or all of the land area of the original function (as planned) into another function which becomes the negative impact (the problem) to the environment and the potential of the land itself. Land use caused by Purposes to meet the needs of a growing population numbers and increasing demands for a better quality of life (Utomo et al, 1992). According Kivell (1993), the quality of land is a physical constraint that is a major obstacle and limit development activity. The limited ability of the land shows that not all efforts can be supported by the land use of the land. Ability of the land to be able to support the efforts of utilization, will depend on the basic physical factors contained in the land, either in the form of environmental hydrology, geomorphology, geology, and atmosphere (Anthony J. Catanese, 1992).

B. Riverbanks

In Government Regulation No. 38 of 2011 on the river mentioned that the river is a natural path or a water container and / or artificial drainage network in the form of water in it, from upstream to the estuary, with restricted right and left border line. In Government Regulation No. 38 of 2011 on the river

banks of the river is mentioned that the space between the edge of the riverbed and foot embankment in located in the left and / or right of the riverbed. According Anggani Silence (2005) Maintenance riverbank is part of the area of the river that are useful to hold and drain the water most of the floodwaters. Thus all kinds of obstructions such as plants are hard to be cut and should not be replanted along the riverbank. Pits or excavation near the foot of the embankment needs to be closed again as high as the banks so as not to endanger the stability of the embankment. Excavation for the purposes of the drainage channel is made in the direction of flow of the river.

C. Analysis of Hydrology and Infiltration

Runoff is when the intensity of the rain that falls in a watershed exceeds infiltration capacity, after the pace infiltrsi met the water will fill the hollows on the surface tanah.Setelah these basins filled, then the water will flow (melimpas) above the ground. Some of the variables evaluated in the analysis of the flood is the flood volume, peak discharge, water level, long inundation and flow velocityRunoff consist of water that comes from three sources:

1. Flow surface.
2. Flow between.
3. The flow of groundwater

One area of residential water conservation techniques is to "rain water drainage system environmentally friendly" is that in its implementation, the system of infiltration (Sunjoto, 1988). In general, infiltration techniques are in the form of a well functioning not as exploitation wells, but as well filling (recharge well). However, this method is less effective in some areas. Therefore, it is necessary to use other techniques such as porous channels where the minimum depth of the ground water is 3 m. This technique is a construct that serves to accommodate and absorb water into the ground through porous media. The concept of absorption calculation on porous channels are in addition to the incoming water deposited in the channel also simultaneously occur leach into the soil. While the water soak into the soil is a function of the geometric factor, coefficient of soil permeability and the depth of groundwater, with the following formula:

$$A_{BR} = \frac{0{,}7.0{,}9.A_{roof}.R.6.\sqrt{T}}{128} \quad (1)$$

with:

A_{BR} = size leach field
A_{roof} = roof area served (m^2)
R = rainfall maximum average
T = factor percolation (minute / cm)

$$B = \frac{Q}{f.K.H}\left((1 - \exp\left(-\frac{f.K.T}{b}\right)\right) \quad (2)$$

with:

B = the channel length (m)
b = channel width (m)
Q = debit incoming water (m3 / s)
f = geometric factor of channels per unit length (m / m)
K = permeability coefficient (m / s)
H = depth effective channel (m)
T = time stream (s)

III. RESEARCH METHODS

The research was done in Samarinda precisely in Karang Mumus riverbank Samarinda in East Kalimantan Province. The analysis used is a combination of quantitative and qualitative analysis.

Steps work study outline is as follows:

1. Availability of facilities and roads
2. Analysis of Hydrology Study Sites
3. Determine the drainage coefficient based on changes in land use.
4. Calculate the discharge of runoff in residential space along the river Reefs Mumus Samarinda.
5. Calculate the loss of water by the discharge of surface runoff and sewage discharge.

IV. RESULT

1. Availability of Facilities and Infrastructure Roads and Drainage

The road network in the city of Samarinda is part of a regional transportation system linking the city of Samarinda city / other districts in East Kalimantan province. Most of the roads in the city of Samarinda own surface paved with good conditions. Based on field observations, the availability of neighborhood streets and footpaths in the area of the River Plate Coral Mumus, already generally available and arranged in a hierarchy ranging from the trail connected with the environment, and the environment associated with collector roads secondary connecting residential areas with other residential area. Availability of long road environment at the study site for regional I 2,074.8m, region II 5,168m, region III 3,367.5m. Average length of availability of existing drainage in the area I was 2074,8m (110.65%), region II 5186m (276.57%), region III 3898,6m (207.92%). This shows that the availability of long drainage categorized excellent research location. Can be seen in the graph 1 below.

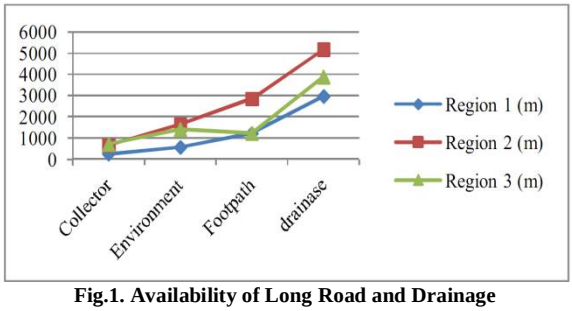


Fig.1. Availability of Long Road and Drainage

For a neighborhood street paving material in the area I in the study site, its availability is sufficient for the entire road environment there has been paved with asphalt material as much as 79.97%. For road paving material existing environment in the region II study site, its availability is sufficient for the entire road

environment there has been paved with asphalt materail as much as 61.43%, material at 10.70% rigid pavement and concrete rebates amounting to 27.87%. For road pavement material III regional environment that existed at the study site, its availability is sufficient for the entire road environment there has been paved with asphalt materail as much as 100%. Can be seen in the graph below.

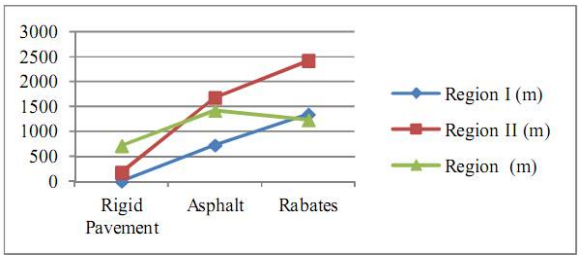


Fig.2. Availability Pavement

2. Analysis of Hydrology, Coefficient Streaming And Surface Runoff

Steps being taken to determine changes in the drainage coefficient values (c) annually to determine the coefficient of flow at each land use in a watershed and then look for the average. The decline in land impermeable to water (impermeable layer) on the regions I, II and III is about 70%. This will cause an increase in the coefficient of flow, thus affecting the increase in the value of surface runoff. To calculate the amount of runoff that occurs in a watershed formula used rationally modified as follows:

$Q = 0.00278 .C_S. C.I.A$

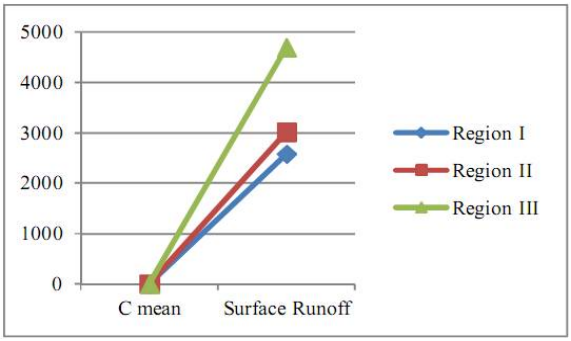


Fig.3. Availability of Long Road and Drainage

3. Loss Of Water In The Settlements Along The Riverbanks Of Karang Mumus Of Samarinda City

Step-by-step calculation of dirty water discharge residents each day are:

- The need for domestic water = 150 liters / person / day
- Non domestic water requirement of 20% x 150 = 30 liters / person / day
- Total water requirement = 180 liters / person / day
- Loss of water = 30% x 180 liters / person / day = 54 liters / person / day
- The need for clean water on average per day = 180 + 54 = 234 liters / person / day multiplied by a maximum factor of 1.15 -1.20 generate maximum daily water needs of = 1.20 x 234 = 280.80 liters / person /day
- Multiplied by a factor of 70% waste water drainage wastewater produces a maximum of = 0.7 x 280.80 = 196.60 liters / person / day = 0.00000228 m3 / person / dt.

The calculation of loss of water in the settlements along the riverbanks of Karang Mumus of Samarinda City are as follows:

No	Region	Water Loss (m^3/dt)
1.	I	0,0261
2.	II	0,03
3.	III	0,034

Table 1. Water Losses on Settlements Riverbanks of Karang Mumus of Samarinda City

So the magnitude of average discharge of water loss in the settlements along the riverbanks of Karang Mumus of Samarinda City is equal to 0.03 m^3 / sec.

CONCLUSION

The decline in land impermeable to water (impermeable layer) on the regions I, II and III is approximately 70%, which will lead to an increase in the coefficient of flow, thus affecting the increase in the value of surface runoff. It will affect the average discharge of water loss in the settlements along the riverbanks of Karang Mumus of Samarinda City is equal to 0.0901 m^3 / sec.The amount of water lost in the settlements along the riverbanks of Karang Mumus of Samarinda City will affect flood discharge and water level of the river.

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