Caused shift voltage degradation and agradation on river

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Abstract. This study aims to find out the degradation and agradation along the river segments and to determine the occurrence of sedimentation processes. Sediment that moves in the river as suspended sediment (suspended sediment) in flowing water and as a base load or (bed load). shift or roll along the bottom of the channel and move in the form of a jump (saltation). this causes eroded surface erosion and basic sediment (bedload). which will accumulate into degradation and aggradation, make the water channel shallow shallow sediment will settle in the sloping river with the speed of water flow that is slow, the ability of the transport itself is affected by discharge, average flow velocity, slope, shear stress. The case study was carried out on the 4 km long goitre river which is a sub-critical quasi-steady stream with the Froude number <0.6. Samples of basic sediment material with variations in grain diameter d35, d50, d65, and d90 in grain size analysis are used for calculations. The process of degradation and agglutation of the riverbed is known by the calculation of sediment discharge using the Meyer-Petter & Muller method.

1. Introduction

The main function of the channel or river is to drain water. In the process of flowing in the channel or river from upstream to down-stream carrying material in the upstream area, it will automatically bring new sediments in the river or river, which is bed load and as low as drift (suspended load).

The main problem in river management as water resources is ero-sion and sedimentation. River stability is an important part, especially in river management. River base stability will be maintained if riverbed grain does not move. River bed grain which is also called sedimentation is one of the causes of damage to a river. The slope of the riverbed, the water discharge and the speed of the river flow greatly affect the riverbed grains carried from the up-stream of the river downstream. Continuous water flow results in scouring on the riverbed, this causes a decrease in the riverbed (degradation) or sediment accumulation in certain sections (agradation) which affects buildings around the river. Transport (bed load) or (suspended load) . What will accumulate into degra-dation and aggradation in a channel becomes shallow. The sediment will be absorbed in a sloping river section with high speed, slow water which causes sediment buildup which can continuous-ly create volume river basin is reduced. This silting resulted in a reduced volume of capacity. Therefore, the need for research and research on travel sediment outflow. the processes that occur be-tween agradation and degradation. with the ability of transport itself is affected by discharge, slope of the channel.

The process of erosion and sedimentation greatly affects the bal-ance of the riverbed configuration. According to Suwartha [5], the factors forming the riverbed configuration are strongly influ-enced by speed, flow duration and depth of flow. Degradation occurs when the incoming discharge is smaller than the sediment transport capability. River bed degradation is generally the result of erosion and as the main intermediary is water which is affected by the velocity of flow [6]. The river bed eroded resulting in a decrease in the riverbed which resulted in the agadation of the next river section. Agradasi occurs because the incoming discharge is greater than the sediment transport capabil-ity so that sediment deposition occurs. which causes the riverbed to rise and be filled with sedimentary grains.

Sedimentation is the process of deposition of material transported by upstream flow due to erosion. Rivers carry sediment in each stream. Sediments can be in various locations in the flow, depend-ing on the balance between the upward velocity of the particles (tensile force and lift force) and the rate of particle deposition [2]. Sediment is a material carried by water flow, which can be divided into 3, namely: [3]) 1. Basic sediment (bed load) The base sediment racks in the river by rolling, sliding and jumping on the surface of the river bed. 2. Suspended loads Drift sediments consist of fine grains smaller than 0.1 mm and are constantly drifting in the water stream. 3. Wrapping sediment (a wash load) In very fine granular form, even though the water is no longer flowing, but the granules remain uncontaminated and the water remains turbid.

2. Methodology

Degradation greatly affects the transport of sediments which have an impact on environmental conditions. Sediment transport, in this case erosion under rivers or canals, occurs when the base shear stress reaches or exceeds critical shear stresses.

Imam Suhardjo [6] in River Degradation suggests that river degradation is very influential on sediment transport which affects the environmental conditions around the river. Sediment debit is calculated using the Meyer-Peter & Müller (MPM) method Analy-sis of parabolic models.

1. The Meyer-Peter & Müller equation is as follows:

$$q_s = \Phi.(\Delta.g.{d_m}^3)^{\frac{1}{z}} \quad (1)$$

where :

q_s = sediment flow rate per m ($\frac{m^3}{m}/s$)
Δ = (sediment density – water density)/water density (kg/m^3)
d_m = median diameter of grains (m)
τ_{cr} = critical tension (N/m^3)
C = Chezzy Coefficient (ml/2/s)

where :

$$u^* = \sqrt{g\ h\ l}$$

$$\delta = \frac{11{,}6\ x\ v}{u^*}$$

$$K_s = \frac{D_{56}s}{d\ D_{90}},$$

If $K_s > 6\ \delta$
then the bottom of the river includes a rough hydraulic
$K_s > 0{,}6\ \delta$

$$(v) = 5{,}75.u.log\frac{42\ h}{\delta}$$

$$\tau_0 = \rho_W.g.h.i$$

$$R_\epsilon = \frac{\tau_{cr}}{\Delta.\rho_W.g.D}$$

$\tau_{cr} = \Delta.\rho_W.g.d_m.0{,}4$
If $\tau_0 > \tau_{cr}$ then the river bottom grain moves, so there is sediment transport

$$C = \frac{v}{(h.i)^{\frac{1}{2}}}$$

$$C' = 18\,log\frac{12.h}{d_{90}}$$

$$\mu = (\frac{C}{C'})^{\frac{3}{2}}$$

$$\psi' = \frac{\mu.h.i}{\Delta.d_m}$$

$$\Phi = (4.\psi' - 0{,}188)^{\frac{3}{2}}$$

The initial step taken in this study was to collect secondary data in the form of discharge data and topographic measurements from the report of the mammary river morphology study and collect primary data by taking sediment samples. The Suangai Asem Gondok River segment is divided into 4 points with a distance of 1 km. Each point will be taken from a sediment sample which is the input data to calculate the sediment discharge using the Meyer-Petter-Muller method so that it can be known the degradation process and agadation that occur. Sediment samples that have been taken will be measured in diameter grains with grainsize analysis by taking d35-d90 granules.

3. Result

From the Asem River section along the 4 km goitre with the dis-tribution of 4 sediment sampling points, it was obtained that from the studied river segments, 4 segments occurred degradation, namely on segment 1 (between point 1 and point 2), segment 3 occurred agradasi (between points. 3 and point 4) The occurrence of the aggression and degradation process is calculated using the Meyer-Petter-Muller method which produces an average value of excess sediment supply (agradation) of 0.0016 $\frac{m^3}{s'}$,while the sediment supply shortage (degradation) occurs for - 0.00174 $\frac{m^3}{s'}$.

Tabel 1. The results of the calculation of the sediment discharge of the asem gondok river in Pacitan district are 4 km

Location	Sediment Discharge Value Per ($m^3/s/m$)	Catagory	Difference
No. 1	0,0005908	Degradasi	-0,0003404
No. 2	0,000931249	Degradasi	-0,0006458
No. 3	0,001577	Agradasi	0,0012360
No. 4	0,000340998	Agradasi	0,0001228
No. 5	0,000218214	Degradasi	0,0017993

Figure 1. Location of researching river asem gondok in Pacitan district

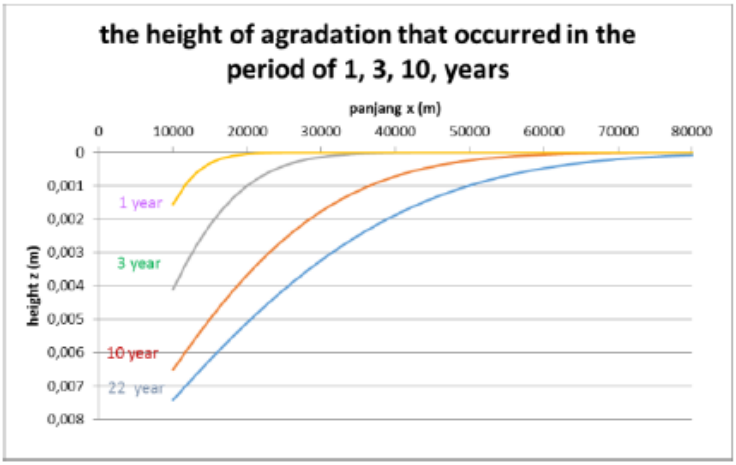

Figure 2. Graph of height of aggression that occurred

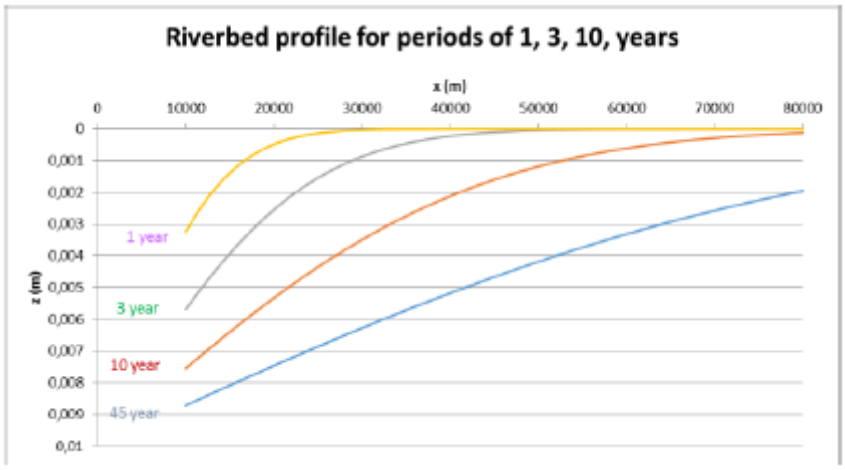

Figure 3. Graph of height of deggrassion that occurred

4. Discussion

While the simulation results of the height of agradation that oc-curred at point 60. m takes 10 years between the initial process of agradation until the achievement of the river bed elevation when the agradation occurs at the first and second points. The height of agradation that occurs is 75 m in 10 years. The same calculation is done to calculate the depth the degradation that occurs is by simu-lating the depth that occurs at the third and fourth points.

Counts of river agro-degradation and degradation during the 10 years when agradation occurs can be seen in Figure 4, the year when degradation occurs can be seen in table 5.

5. Conclusion

Based on the results of research and discussion that have been exposed above, it can be concluded that from the calculation of sediment discharge that occurs using the Meyer-Petter-Muller method, it is known that the river asem gondok in Pacitan district with a river length of 4 km occurs agradation on section 1 (between point 1 and point 2), segment 3 occurs agradasi (be-tween points .3 and point 4),) with an average excess of sediment supply of 0.00169 $\frac{m^3}{m}$ / day, days while the lack of sediment supply (degradation) occurs at -0.0017 $\frac{m^3}{m}$ / day.

Acknowledgement

On this occasion the authors say thank you

1. Dr. Eng. Ir. Syafii., MT., As Chairperson of the Civil Engineering Master Program at the Eleven March University of Surakarta
2. Dr. Cahyono Ikhsan, S.T., M.T., as Counselor I
3. Dr. Ir. Rr. Rintis Hardiani., MT., As Advisor II.
4. All of them who have helped the author complete this thesis, which cannot be mentioned individually

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