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The Effect of Deforestation on Flows in Straight Compound Channels

Nyamne Tayeng[1], Dr. Mimi Das Saikia[2]

M.Tech, Student, Dept. of Civil Engineering, ADTU, Guwahat, Assam, India[1]
Professor, Dept. of Civil Engineering, ADTU, Guwahati, Assam, India[2]

Abstract – *The loss of trees and plants causes several serious problems i.e loss of biodiversity, loss of soil fertility, flooding, water pollution, changing of climates etc. The deforestation can be occurred by Natural disaster and man-made disaster. Mostly it occurs by man-made disaster as the human uses the natural resources in many activities. Cutting of trees and clearance of area can cause the landslide, soil erosion takes place in our place which results the loss of livelihood, property etc. A compound channel consists of the main channel and flood plains on the channel with different bed resistances. Here the slope of the channel bed is changed in every different resistance with same discharge. The compound channel consists of both flood plains submerged.*

Key Words: Composite resistance, compound channel, manning's, discharge, floo

1. INTRODUCTION

Deforestation causes soil erosion in the river bank due to the effect of deforestation. In the downstream of the river in low land area it deposited the sediments which can be a serious problem in future for those people living in that proper area. In rainy season run off from the steep slope can cause landslide and damage the road construction. It can produce more velocity in the main channel.

2. RELATED LITERATURE REVIEW

Yunjun Yao et. Al. (2014) estimated for the deforestation and climate variability on terrestrial evapotranspiration(ET) in Subarctic China. Tropical regions are although effects hydrology and climatic variable due to deforestation. Some riparian areas have passively reforested in response to changes in land use, especially in areas where agricultural uses are in decline its actual contributions to changes in Evapotranspiration (ET) over subarctic China remain unknown. ET are estimated Using a semi-empirical Penman (SEMI-PM) algorithm driven by meteorological and satellite data to establish a quantitative relationship between deforestation and terrestrial ET variations, at both local and regional scales. Finally the results indicate that the estimated ET can be used to analyse the observed inter-annual variations.

Dr. Mrs. S. Maria Packiam (2015) mention the causes and consequence of deforestation which takes place everyday due to growth of the population, grazing , logging, burn method of burning , global warming, wild fire, quarrying, urbanization , acid rain, hydro-electric projects , mining etc. These are the most basis reasons in our day to day life which leads to disappearance of sustainable development. This biodiversity has multiple social and economic values, apart from its intrinsic value.

3. EXPERIMENTAL DETAILS FOR RECANGULAR COMPOUND CHANNEL

Experimental work is done in 6 m long with 0.3 m width open rectangular compound channel with all the required data with constant discharge and varying slope for deforestation, plants and grasses in each case. For all the cases each value is taken in longitudinal distance and lateral distance of a channel with the bed resistance.

Figure no. 1 Cross section of rectangular compound channel floodplain with vegetation

Figure no. 2 Cross section of rectangular compound channel floodplain without vegetation

In a rectangular compound channel with 6 m long and 0.3 m width is shown in fig. no. 1 is represent with vegetation in both floodplain side with various

vegetations like plants, grasses and in fig. no.2 no vegetation in both floodplain side because of deforestation which helps in finding the velocity flow prediction in both the compound channel.

Cases		Discharge in m^3/sec	Slope	Details of the compound channel in 6 m flume
Case-A	Case-A1	Q1=0.0008	1:150	PVC as bed material
	Case-A2	Q2=0.0008	1:150	PVC as bed material
	Case-A3	Q3=0.0008	1:150	PVC as bed material
	Case-A4	Q4=0.0008	1:150	PVC as bed material
Case-B	Case-B1	Q5=0.00114	1:200	PVC as bed material
	Case-B2	Q6=0.00114	1:200	PVC as bed material
	Case-B3	Q7=0.00114	1:200	PVC as bed material
	Case-B4	Q8=0.00114	1:200	PVC as bed material

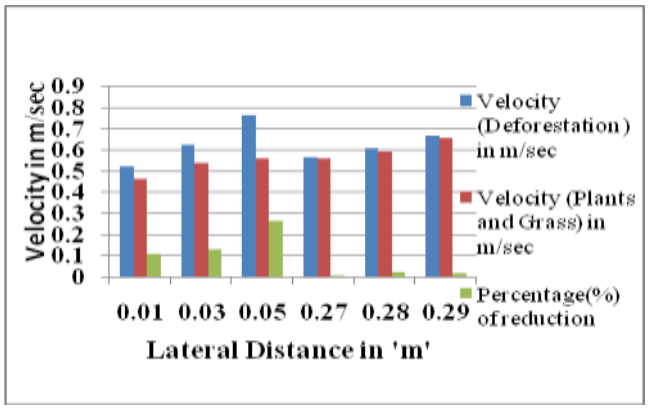

Chart- 1: Effect of deforestation in 1 'm' Cross section with Discharge (Q1) = 0.0008

Percentage error (%) for the velocity (deforestation) and Velocity (plants and grass) for Discharge, Q= 0.0008m^3/sec, S=1:150 is shown in chart-1 here, Vegetation reduction for the flow of velocity in the channel in Lateral distance 1 m it shows percentage of reduction as 27% because the presence of plants acts as the resistance to the flow which reduces the velocity is the channel bed. In many cases the velocity for deforestation has been observed to be more than the velocity for vegetation.

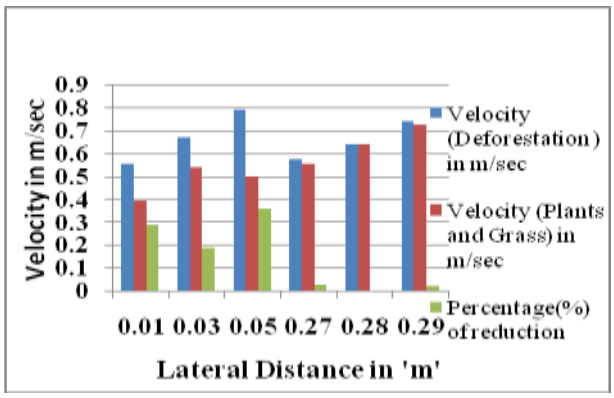

Chart- 2: Effect of deforestation in 2 'm' Cross section with Discharge (Q2) = 0.0008

Percentage error (%) for the velocity (deforestation) and Velocity (plants and grass) for Discharge, Q= 0.0008 m^3/sec, S=1:150 is shown in chart-2 here, Vegetation reduction for the flow of velocity in the channel in Lateral distance 2 m it shows percentage of reduction as 36% because the presence of plants acts as the resistance to the flow which reduces the velocity is the channel bed. In many cases the velocity for deforestation has been observed to be more than the velocity for vegetation.

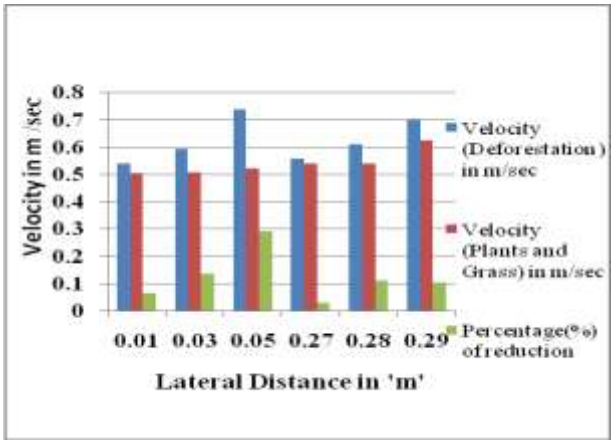

Chart- 3: Effect of deforestation in 3 'm' Cross section with Discharge (Q3) = 0.0008

Percentage error (%) for the velocity (deforestation) and Velocity (plants and grass) for Discharge, Q= 0.0008 m^3/sec, S=1:150 is shown in chart-3 here, Vegetation reduction for the flow of velocity in the channel in Lateral distance 3 m it shows percentage of reduction as 29% because the presence of plants acts as the resistance to the flow which reduces the velocity is the channel bed. In many cases the velocity for deforestation

has been observed to be more than the velocity for vegetation.

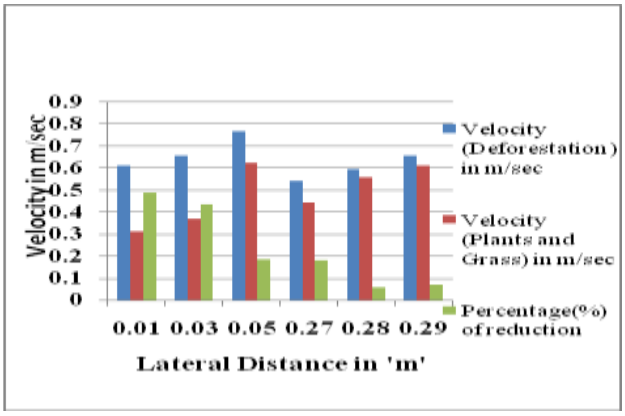

Chart- 4: Effect of deforestation in 4 'm' Cross section with Discharge (Q4) = 0.0008

Percentage error (%) for the velocity (deforestation) and Velocity (plants and grass) for Discharge, Q= 0.0008 m^3/sec, S=1:150 is shown in chart-4 here, Vegetation reduction for the flow of velocity in the channel in Lateral distance 4 m has the highest vegetation reduction it shows percentage of reduction as 49% . It represents more percentage reduction than the others. This is because the presence of plants acts as the resistance to the flow which reduces the velocity is the channel bed.

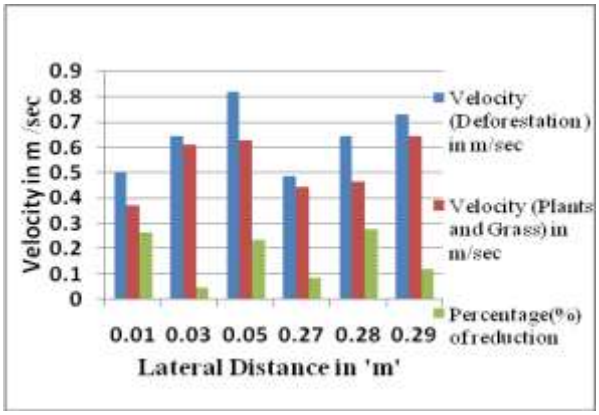

Chart- 5: Effect of deforestation in 1 'm' Cross section with Discharge (Q) =0.00114

Percentage error (%) for the velocity (deforestation) and Velocity (plants and grass) for Discharge, Q= 0.00114 m^3/sec, S=1:200 is shown in chart-5 here, Vegetation reduction for the flow of velocity in the channel in Lateral distance 1 m it shows percentage of reduction as 28% because the presence of plants acts as the resistance to the flow which reduces the velocity is the channel bed. In many cases the velocity for deforestation has been observed to be more than the velocity for vegetation.

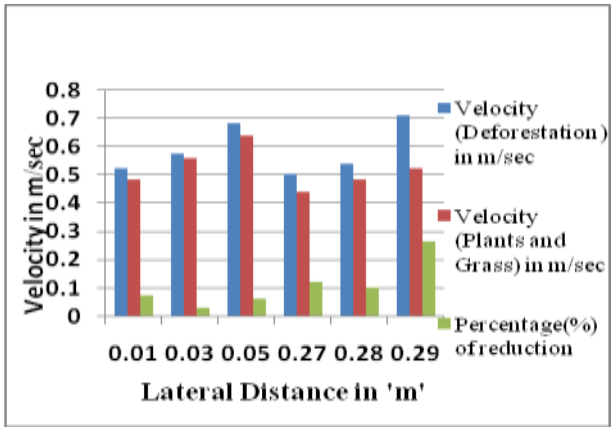

Chart- 6: Effect of deforestation in 2 'm' Cross section with Discharge (Q) =0.00114

Percentage error (%) for the velocity (deforestation) and Velocity (plants and grass) for Discharge, Q= 0.00114 m^3/sec, S=1:200 is shown in chart-6 here, Vegetation reduction for the flow of velocity in the channel in Lateral distance 2 m it shows percentage of reduction as 27% because the presence of plants acts as the resistance to the flow which reduces the velocity is the channel bed. In many cases the velocity for deforestation has been observed to be more than the velocity for vegetation.

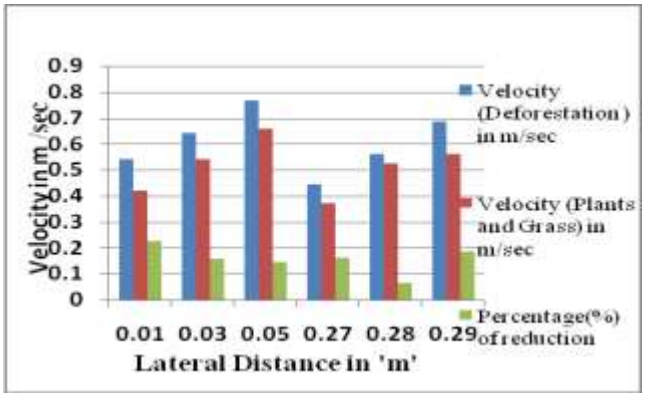

Chart- 7: Effect of deforestation in 3 'm' Cross section with Discharge (Q) =0.00114

Percentage error (%) for the velocity (deforestation) and Velocity (plants and grass) for Discharge, Q= 0.00114 m^3/sec, S=1.200 is shown in chart-7 here, Vegetation reduction for the flow of velocity in the channel in Lateral distance 3 m it shows percentage of reduction as 23% because the presence of plants acts as the resistance to the flow which reduces the velocity is the channel bed. In many cases the velocity for deforestation has been observed to be more than the velocity for vegetation.

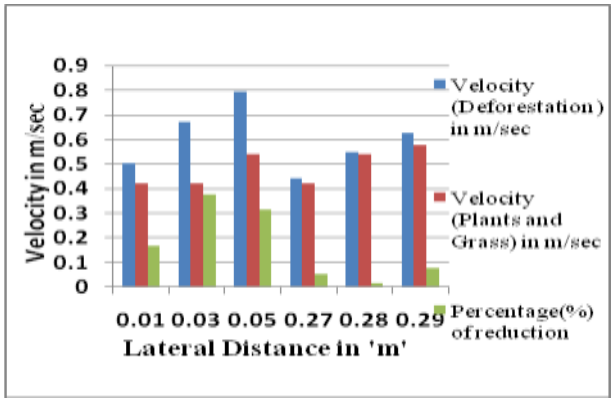

Chart- 8: Effect of deforestation in 4 'm' Cross section with Discharge (Q) =0.00114

Percentage error (%) for the velocity (deforestation) and Velocity (plants and grass) for Discharge, Q= 0.00114 m^3/sec, S=1:200 is shown in chart-8 here, Vegetation reduction for the flow of velocity in the channel in Lateral distance 4 m it shows percentage of reduction as 38% because the presence of plants acts as the resistance to the flow which reduces the velocity is the channel bed. In many cases the velocity for deforestation has been observed to be more than the velocity for vegetation.

3. OBSERVATIONS AND DISCUSSION

Analysis of effect of the deforestation has been considered for the percentage reduction due to the impact of vegetation on various flow characteristics in a rectangular compound channel. It is observed that velocity is reduced due to the vegetation in the channel. Deforestation caused deposition of sediment transportation in the plain area which is effected the flow in river. Hence, planting of trees can avoid soil erosion in the bank of the river. In this experimental work the case-V with slope 1:150 give more percentage reduction in the channel with discharge, Q=0.0008m^3/sec. For that the deforestation /afforestation has been measured for different cases and its impact on the various flow characteristic in a compound rectangular channel has been examined in this channel. From this study it recommended afforestation to control soil erosion and to solve siltation problem.

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