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THE STUDY OF DOWNSTREAM CHANGES IN THE CHANNEL FORM IN PART OF MUTHA RIVER, PUNE, MAHARASHTRA

Kale Nilesh Pandit[1] and Sulochana Shekhar[2]

INTRODUCTION

The Morphology of a River Channel May be described by its dimension in placed in cross section These cross-section are commonly considered in isolation but it must be remembered that they are strongly interrelated. The appearance or the channel Geometry of a river is the sum of four channel Characteristics shape size, slope and pattern or plan form. All the four variable interrelated and interdependent.

Introduction of the study area

Mutha River is tributary of Bhima River, which is main tributary of river Krishna. The study area is from Khadakwasala dam downstream to confluence of Mula and Mutha River .Mutha River Main channel length is 15.6 km on study area. Mutha River originate in the Western Ghat Mutha river originate in the upstream of Pune at Devghar villages. The Study area situated on the western margin of the Deccan plateau and lies on the leeward side of the western Ghat. The city is approximately 50km from the Crestline of the Sahyadri. The Mula and Mutha joined to each other a few km. east of the Pune is core.

Location MAP

ABSTRACT

The form or shape of the channel determine the area of fraction between the flowing water and the channel bed bank represent by perimeter .shape represent the configuration or form of the channel in cross-section. The shape of the channel is determined by its width and depth. It is therefore often measured by the ratio of water surface width to mean depth the ratio is known as the form ratio (scumm1977)The type and density of vegetation cover also influence of the channel shape river increase your width and depth ratio.

All the cross-section taken on Khadakwasala dam downstream area In the monsoon season ,release the water to khadakwaala dam that time velocity of water is high , remove the all material in first cross-section area.

Almost the Mutha River channel bed is rocky, covered basalt rock. Erosion feature are form such as potholes, Gully, Gorge etc. and some part point bar, gravel bar deposited. In the Six cross-section area river naturally form island. On the island deposited gravel, boulder, sand, alluvial material etc. island shape is longitudinal. Width is less and length is more. Mutha river is not flowing naturally because control discharge by Khadakwasala dam. Over flow of dam release on dam and flood affected Pune mega city.At the confluences all the nalas are inside indicating that the tributaries have not adjusted their profiles to the main river that is observed in the field e.g the right bank of the Mutha near varje has adjusted its bed to the river by waterfall. The Mutha river is circular shape of the basin so the after rainfall rapidly in flood, high quantity in discharge. The Mutha river channel size is decreases upstream to the downstream, but natural river upstream to the downstream channel size increases.

KEYWORDS :*Downstream Changes , Mutha River, cross-section.*

SHORT PROFILE

Kale Nilesh Pandit is working as a Assistant Professor at Department of Geography in S. P. College, Tilak Road,Pune.

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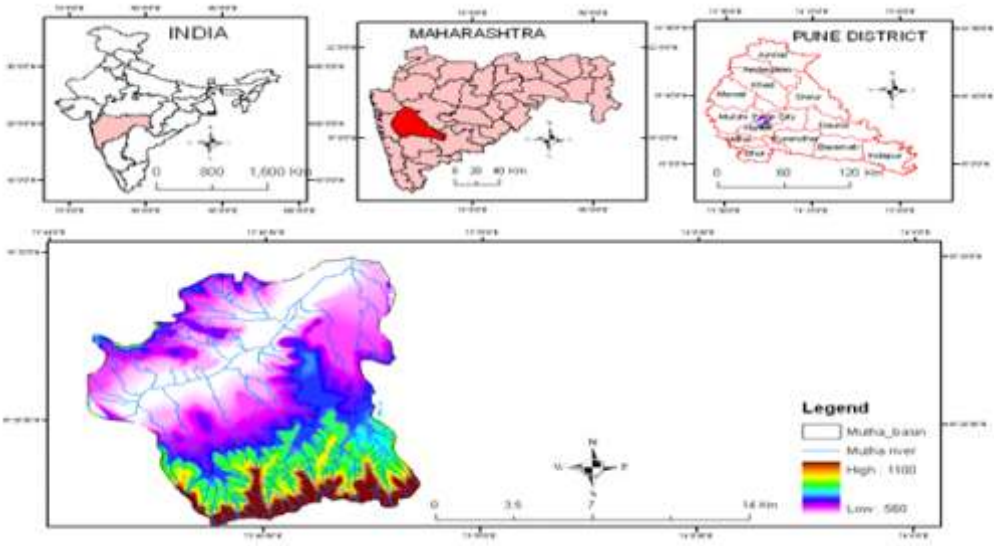
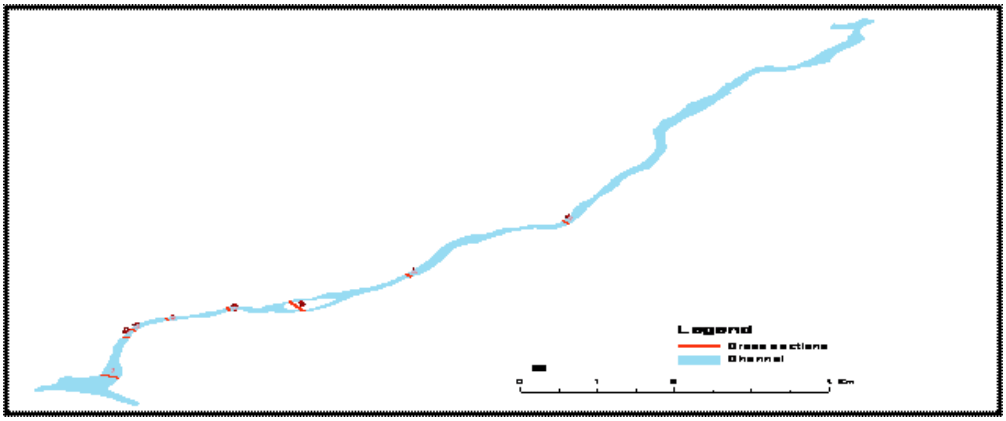


Location of Cross Section



Physiographic setting

The Pune city (18^{0}20' to 18^{0}38' N and 73^{0}45' to 73^{0}55'E) is situated at the confluence of two seasonal rivers, namely the Mula and Mutha. These rivers originate in the Western Ghats. Mula and Mutha rivers originate in the upstream of Pune at Mazgoan and Devghar villages. The Mula and Mutha drains into the Bhima River, a major tributary of the Krishna River. The total catchment area of the Mutha River is about 155.84 km2 (study area). The length of the river channel is 663.89 km (Includes all stream order). These rivers are seasonal in nature and carry water only during the monsoon seasons.

GEOLOGY OF PUNE

Almost the entire morphological strata of the Pune city comprises of Deccan trap basalts, with layers of different basalt types. These different types of basalt create a complex environment for groundwater, sometimes with and interconnected system of aquifers, due to the layered nature of basalt and transected by regional fracture traces. Barometric measurements along the course of the major river show a fall in level to the east, and southeast.

CLIMATE

Among the various climatic elements rainfall one of the most important element in the study area. Average rainfall in the Pune district is 600 to 700 mm. This is usually during the monsoon months from July - October. Moderate temperatures is mainly observed here. The rainfall is unpredictable in tune with the Indian monsoon. Summers here begin from early March to July. Summers are dry and hot. The temperature ranges from 20°C to 38°C, though at the peak they may reach above 40°C. From November to January, is the winter season. Temperatures at the peak drop to single digits but usually around 9°C to 14°C sometimes it lowers up to

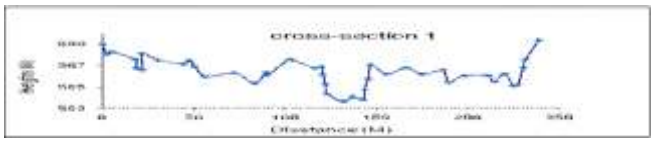
3°C. January to March are the months with moderate temperatures.

VEGETATION

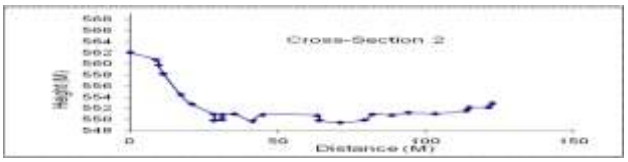
The monsoon type of climate. The vegetation is mostly deciduous and semi evergreen type. The important tress are babul, limb, bore, chinch.etc. The forest cover is general restricted to hilly areas only.

METHODOLOGY

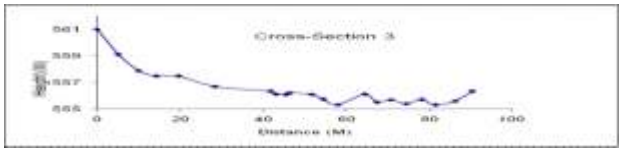
We was gone to field do the Dumpy level survey. Firstly we can select the location where taken cross-sections. Mostly change in the river channel and bend of River their taken the 8 cross-section. We has been done the Dumpy level survey carry the cross-section of the river. I was calculate data and drown cross-section in the Excel software. The first drainage network was created from topographic maps using manual digitizing of the blue lines in ARC GIS. Topographic maps scaled at 1: 50000were registered using UTM projection plane (ED 50, Zone 35 N), which is the national co-ordinate system of the topographic maps



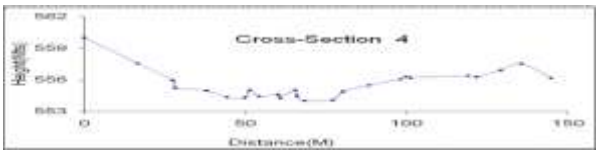
This is cross-section taken on downstream of Khadakwasala dam cross-section area is rocky, observed all scabland area, rockpatches, all emotional features. During monsoon season, the water is released from Khadakwasala dam. Due to , high velocity flow of water, no deposition, only erosion take place in this cross-section. In the River channel middle part from 8to 9 mts. gorge, potholes, Gully, rapid are form. Right bank of the River is steeper and Left bank is gentle. The river Width is 238.86 mts. and depth is 3.2 mts. The form ratio is 74.6



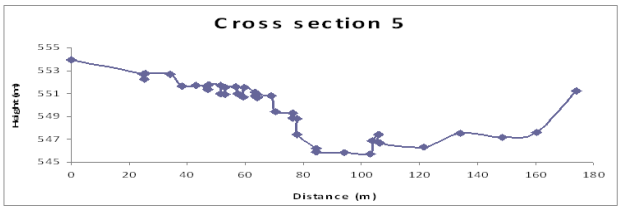
In the river bed some deposition has been found. Since the water flowing high velocity only bigger size partials such as pebbles, gravel, cobbles, boulders deposited. Here point bar is form. Thalwage flowing in the middle part of channel. Small patches of grasses are grown in the river bed. Right bank of the channel is steeper and Left bank gentle slope. The width of the channel is 122.36 mts. And depth of the channel is 1.01mts. form ratio is 121.14



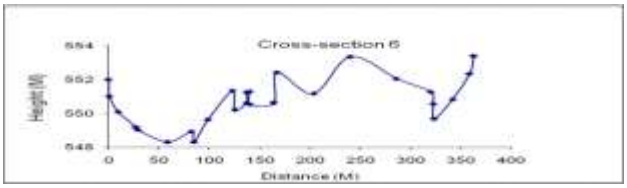
In this cross-section area the following points are observed in the field. Here left bank of river is steeper. The river deposited gravel, pebbles and boulders along its left bank. In the right bank erosion take place. Séance the river is slightly meander. In the monsoon river is over flowing and spread in to the adjoining agriculture land. Here width of River is 90.35 mts. And depth is 2.99 mts. The form ratio is 75.29



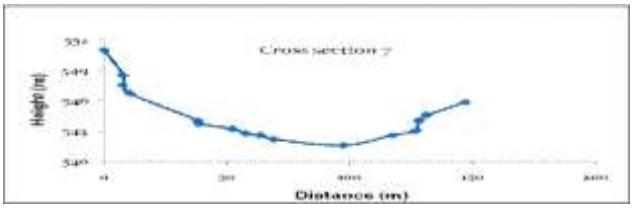
In this cross section area is rocky terrain also rock patches have been seen. On the left bank of river a village is situated, and that part of the river polluted. Thalwage Of river to middle part, close to the left bank erosion take place, Near to the right bank deposition, pebbles, gravel, alluvial material etc. have been observed Width of river channel 144.89 mts. and depth 5.4mts. The form ratio is 26.83



Here River is slightly meander. Right bank of river is outer bank, so that place erosion take place and inner bank deposit alluvial material. On the Right bank found the basalt rock. There is form potholes. Middle part flowing thalwage of River. Width of channel is 147mts. And depth is 3.2 mts. the form ratio is 45.93



In this cross-section, the main feature is River Island in the river of middle part of channel. Water flow on both side of island. Cobbles, gravels, pebbles, sand, alluvial material deposited. Middle part of the Island human interfere take place, channel disturbed by the human. Channel is shallow, depth is less but width of the channel is high. The width of channel is 362 mts. and depth is 3.7 mts. The form ratio of channel is 97.83



In this Cross-section taken on Varje Bridge upstream. Here left bank of the river is steeper. Channel depth is average but width is less. Here gravel, sand bar are seen. No erosional features, bed at the channel is smooth. Width is 147 mts. and depth is 4.3mts.the form ratio is 34.18.

This cross-section has been taken near to the Vitthalwadi. Here River is slightly Meander. In that area not Natural River bed, human interference there, construction by the Municipal Corporation and built concrete wall in the middle part. This area river nor flowing naturally. The river width is 125m and depth is 3.2m. The form ratio is 39.0

Over all Interpretation:

All the cross-section taken on Khadakwasala dam downstream area In the monsoon season ,release the water to khadakwaala dam that time velocity of water is high , remove the all material in first cross-section area.

- Almost the Mutha River channel bed is rocky, covered basalt rock. Erosion feature are form such as potholes, Gully, Gorge etc. and some part point bar, gravel bar deposited. In the Six cross-section area river naturally form island. On the island deposited gravel, boulder, sand, alluvial material etc. island shape is longitudinal. Width is less and length is more. Mutha river is not flowing naturally because control discharge by Khadakwasala dam. Over flow of dam release on dam and flood affected Pune mega city. Mutha river and their tributaries are highly seasonal or ephemeral in nature and carry under during the monsoon
- Maximum river depth increases and the form ratio decreases downstream
- At the confluences all the nalas are inside indicating that the tributaries have not adjusted their profiles to the main river that is observed in the field e.g the right bank of the Mutha near varje has adjusted its bed to the river by waterfall.
- The Mutha river is circular shape of the basin so the after rainfall rapidly in flood, high quantity in discharge.
- The Mutha river channel size is decreases upstream to the downstream, but natural river upstream to the downstream channel size increases.

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