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ANALYSIS OF SOME HYDROLOGICAL CHARACTERISTICS OF UPPER KUNDALIKA RIVER BASIN, RAIGAD, MAHARASHTRA

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ABSTRACT

In the present work, an attempt has been made to study quantitative geomorphologic analysis of the upper kundalika waters head of kundalika river basin, Raigad, Maharashtra. The study involves traditional top sheet, GIS, techniques which prove to extremely helpful in evaluating and comparing the hydrological characteristics of the river.

KEYWORDS: *River Islands, Rocky Outcrops, Channel Morphology*

INTRODUCTION

The differentiation of braided channel types also has a geographic scope. Bar and island-braided patterns are associated with different types of flow partitioning, dependent on stream shape, sediment, and hydraulics regime. Small rivers where channel density increases show a two fold increase in flow partitioning with the largest values associated with semi-mountainous gravel-bottom rivers.

The demand for water has increased over the years, hence assessment of water quality and quality has become necessary for its best use The available surface and groundwater resources are inadequate to meet the increasing water demand due to rapid urbanization, increasing population and changing climatic conditions. Identification and characterization of various ground features, such as surface and subsurface structures, geomorphic features and their hydraulic characteristics, can serve as direct or indirect indicators of the presence of ground and surface water. Understanding geomorphic conditions is an important factor in characterizing the hydrogeological characteristics of hard rocks.

Quantitative morphometric analysis to helps to understand the overall role played by lithology and structural geology in the network patterns and development of watersheads. The morphological parameters of a watershed reflect its hydrological response to a respectable extent and can be useful in synthesizing its hydrological behaviour (zende et al.,2011)

STUDY AREA

The latitudinal extent of the study area of Upper Kundalika basin is 18°20'North to 18°35'North and longitudinal extent is 73°40'Eastto 73°11'East. The Upper Kundalika maintains fairly straight course in E - W direction up to Roha and then follows as SE-NW trend.

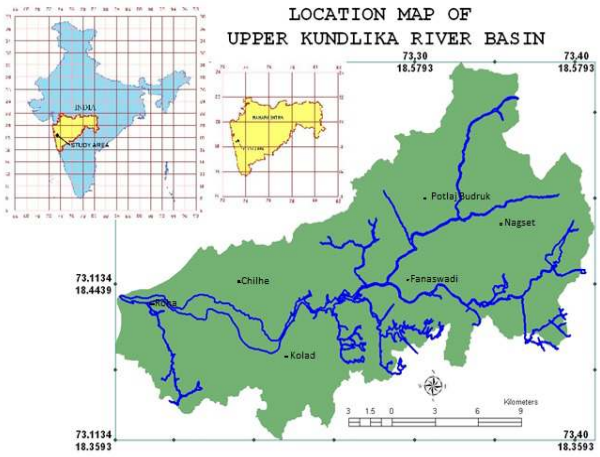

Figure 1:

The Upper Kundalika is a small river flowing from the Hills of Sahyadri to the Arabian Sea. The distance of the Upper Kundalika basin is 42.5 km and total area covered by this watershed is 387.51 sqkm.

STUDY APPROACHES

1. Channel pattern characterized by spatial and temporal dynamics.
2. Each braided reach is characterized by a plurality of laterally moving, intersecting channels, which are established by the division of the non-braided channel and terminate where all the channels join.
3. Identification of appropriate scales of flow partitioning and associated phenomenon treatment is implied by dynamic scaling. This scaling is considered a fundamental element of braided river morphology (Hunde and Ashmore 2009) and enables us to treat flow partitioning systems of various sizes.

METHODS

Following Methods are carried by Present Study:

1. The entire study area has been delineated from a using survey of india topographic map number 47F/3, 47F/6, 47F/7 at scale 1:50000.
2. By using Google earth images & field work
3. Arc GIS

DISCUSSION

Hydrological variables that influence water temperature in rivers include water source, relative contribution from groundwater, current velocity, and water depth (Arscott et al. 2001; Alexievsky and Chalov 2009). The latter parameters are a function of channel form, water volume and substrate type, and depend primarily on water discharge. The temperature regime in the main channels and side braids is influenced by variations in channel discharge and the relative contributions of groundwater and surface water runoff.

RIVER ISLANDS AND ROCK OUTCROPS IN THE RIVER:

An island is said to be a land in the middle of a river or sea with water on all sides of it. And rock outcrops is a hard rock which lying in river bed in present paper highlight this points in the upper kundalika river basin. These all things we showing with diagram and google earth images.

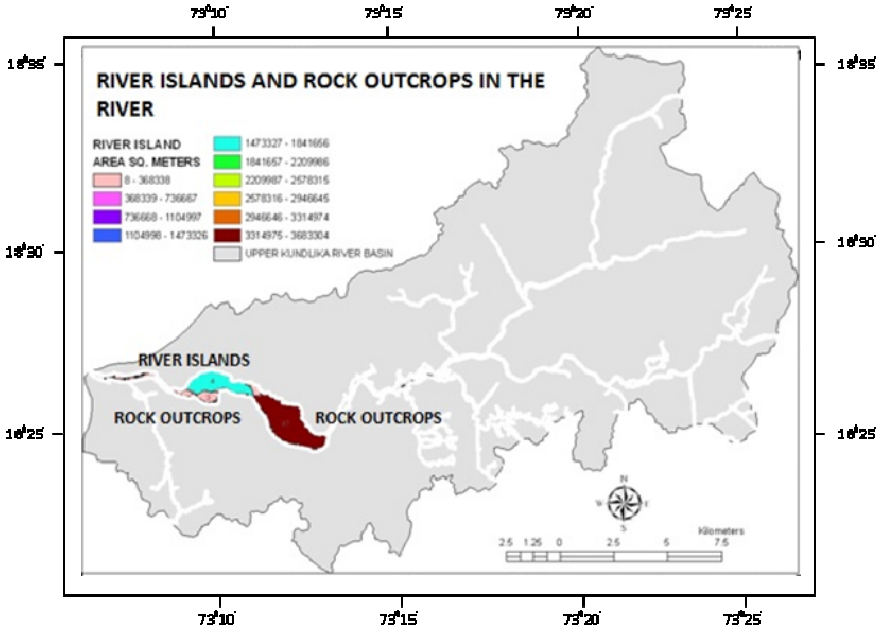

Figure 2:

By studying the river islands and rockoutcrops, you get to know the river erosion and changes in river water velocity and the biodiversity that occurs on those islands.

There are some perennial and non- perennial spots seen in the Upper Kundalika river basin. Basically these spots are seen in the summer season. At Verse 18˚26'348"Nand73˚78'888"E in that place river is perennial. The elevation of that point is 16.79 m at that location there are seen a large rock outcrops. At Rhote (Budruck) 18˚26'360"Nand73˚08'048"E situated on in the Upper Kundalika river basin an island is seen. The elevation of that spot is 7.92 m. Between Kill and Udadvane bridge at 18˚25'60"Nand 73˚11'50"E rock outcrops is seen, and the river is perennial. The elevation of that place is 7.01 m. There is influence of Dolvahaldam (right bank) which location is 18˚25'60"N and 73˚13'188"E. Elevation is39.86 m. Characteristic of that river is Perennial river. Nearby that place there are confluence of Mahindara river and Kundalika river. The location of that confluence is 18˚25'024"N and 73˚12'909"E. The elevation is 18.04 m, and the status of river is Perennial river.

Near Sutarwadi at downstream the river characteristics is seen non perennial. Near Saje the status of river is perennial.

RIVER ISLANDS NEAR TALA

Figure 3:

Figure 4:

Figure 5:

Figure 6:

MORPHOLOGICAL CHARACTERISTIC OF CHANNEL

The variables that determine the channel morphology of modern and palae-channels are discharge and the sediment load. Data on discharge and sediment are not available for the modern channel of the Upper Kundalika river and its tributaries. It is, therefore, necessary to collect information about the modern cross-sections of the river system under review. The shape, size and area of the channels are closely related to the discharge (Schumm, 1977). The Form ratio (w/d) and the channel capacity (wd) therefore, can be substituted for discharge, to get some idea about the hydraulic characteristics. The width and depth parameters are significantly related to other morphological characteristics of a channel (like, gradient, wave length, sinuosity and perimeter sedimentology) and to its hydrology. The data collected accordingly is given in the table below

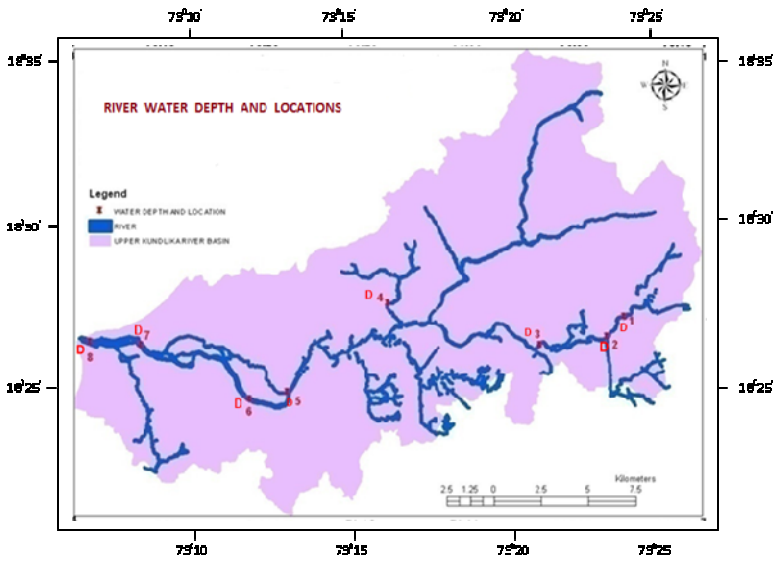

Figure 7:

1. **Channel depth: -**With the onset of flood discharge, the hydraulidic characteristics of the Upper Kundalika river basin and its tributaries change from small channel flow to sheet flows. Small channels which way to an influx to strong sediment laden water during monsoon, which covers much of the river channel. The water depth ranges between 0.457 to 1.219 m. It increases 5 to 6 times more in monsoon.

2. **Channel width: -**Early investigators have demonstrated that width of channel is significantly related to channel cross-section and to discharge (Leopold and Wolman, 1970, Schumm, 1977). In the study area, the average varies between 33.95 m to 225.75 m. The perimeter increases downstream. The width is highly correlated to the channel capacity.

Table: 1 Kundalika River Water Depth and Locations

D.No	Latitude	Longitude	Depth of water level	Elevation (m)	River bank length in meters	Form ratio	Channel capacity (sq. m.)
D_1	18°27.176"	73°22.525"	0.457 m	57.3	44.73	97.87	20.44
D_2	18°26.601"	73°22.020"	0.731 m	48.9	40.21	55.00	29.38
D_3	18°26.363"	73°20.114"	1.219 m	43.8	64.66	53.04	78.82
D_4	18°27.549"	73°15.770"	0.152 m	26	33.95	223.35	5.16
D_5	18°25.035"	73°12.889"	0.914 m	18.4	109.38	119.67	99.97
D_6	18°24.850"	73°11.825"	0.792 m	16	159.44	201.31	126.27
D_7	18°26.366"	73°08.707"	0.487 m	5.5	224.83	461.66	109.49
D_8	18°26.463"	73°07.251"	0.487 m	2.8	225.75	463.55	109.94

Form ratio: Scrums (1960) studies indicate that Form ratio (F) reflects the nature of sediments in the bed and banks. The ratio is directly related to peak discharge and is inversely related to gradient. In a general way, the ratio exhibits an increase in downstream directions, indicating a downstream increase in discharge, but a decrease in sediment size and channel gradient.

Table: 2 Water Velocity Summer and Winter

Sample No	Latitude	Longitude	Velocity (m/s) SUMMER	Village
V1	18°26'466"	73°07'251"	0.035	Ashtami
V2	18°26'362"	73°08'709"	0.047	Udadvane
V3	18°26'369"	73°20'107"	0.20	Saje
Sample No	**Latitude**	**Longitude**	**Velocity (m/s) WINTER**	**Village**
V1	18°26'466"	73°07'251"	0.017	Ashtami
V2	18°26'362"	73°08'709"	0.026	Udadvane
V3	18°26'369"	73°20'107"	0.094	Saje

Above table indicates the velocity of water and reading takes place in summer and winter season it shows that in winter season the velocity of water is very more than summer season.

CONCLUSIONS

Understanding geomorphic conditions is an important factor in characterising the hydrological characteristics of hard rocks. Quantitative morphometric analysis helps to understand the overall role played by litology and structural geology in the drainage network patterns and development of watersheds. The morphometric parameters of a watershed reflect its

hydrological response to a respectable extent and can be useful in synthesizing its hydrological behaviour.

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