



## TO STUDY THE IMPACT OF LAND - USE LAND - COVER ON LANDFORMS OF MULA RIVER BASIN MAHARASHTRA, INDIA

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### Abstract :

The study of the land use-land cover and its impact on geomorphic features is characterized and it is essential for the purposes of planning and development towards economic development in the study area. Because all of us know the near about 70 percent Indian economy is depend on agricultural sector so we should know which cropped pattern is more effective to support our economy, as well as people of the study area. Landforms or different geomorphic features and land use and land cover patterns are closely related to each other.

**Key Words:** Mula River, Basin, Land-Use-Land.

### 1.1 INTRODUCTION:

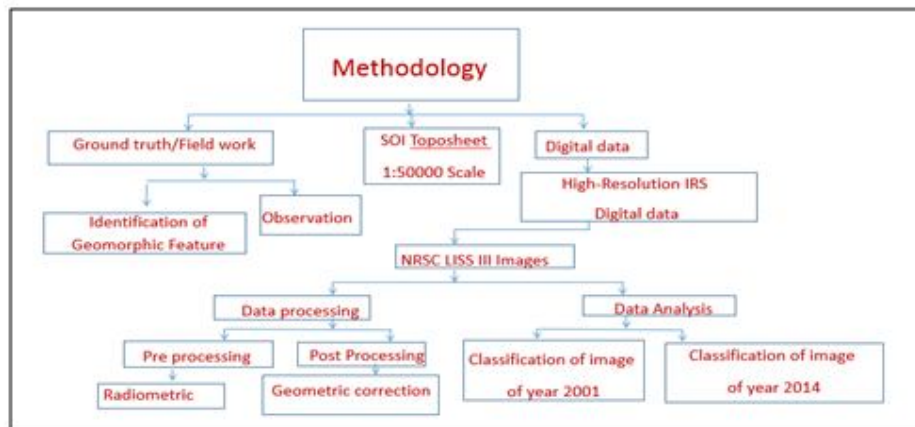
Geomorphic features plays a vital role in monitoring land use land cover of the study area. Different geomorphic features are controlled there slope because of that the land use pattern is automatically controlled but now a day people are doing more practices along the different geomorphic features like steep slope is converted in to gentle slope by using different earth mover technology. Other important thing is that people are even bringing fertile soil from different places like dam mud or Lake, Tank mud toward the unfertile or steep slope and there they are doing agricultural practices. Some landforms with their hidden resources like underground water improve the quality of land, if proper exploitation of such resources is carried out whereas, some other landforms impose over land use severe limitations due to flooding because of their low lying nature, close to river or sea (Nageshwara Rao and Vaidyanadhan, 1990). According to the Allan James and Scott A Lecce (2013) they are study the impact of land use – land cover change on river system in their study they are find out that landscape sensitivity and scale; changes to processes of flood generation, soil erosion, sediment sequestration, and sediment yields; how accelerated water, erosion, and sediment deliveries transform fluvial systems; and the long-term history of land-use change impacts following the Neolithic advent of agriculture and its spread. In covering these topics, the chapter introduces the newly emerging field of land-change science. According to **Manoj Kumar Mahato and N. C. Jana (2019) they have study the Impact of Landforms on agriculture land use pattern: A case study of Salda river basin in Purulia district west Bengal** This study is reflecting the typical land characteristics of the fringe area of Chhotanagpur plateau, where some typical geomorphic attributes control the productivity of the land and also controls the socio-economic conditions of the local people. The present authors have tried to examine the typical geomorphic attributes and their effects on present productivity of the land in a micro level

study, where agriculture is the main source of income. Because of in this chapter an attempt has been made to identify the present geomorphic features present in the study area and identified the impact on theme by land use-land cover. The landform and their geomorphic processes like weathering and erosion surface removal of slope, drainage processes etc are affected by anthropogenic activities like land use-land cover and soils removal have different land use patterns inducing the different geomorphic features. Landforms and land use categories were carried out and their results have been discussed in following subhead.

## 1.2 OBJECTIVES OF THE STUDY

1. Highlight the human activities operating over the study area.
2. To find out the impact of recent changes in the land use Land cover on the geomorphic features of the study area.

## 1.3 METHODOLOGY



## 1.4 FIELD /LAB WORK

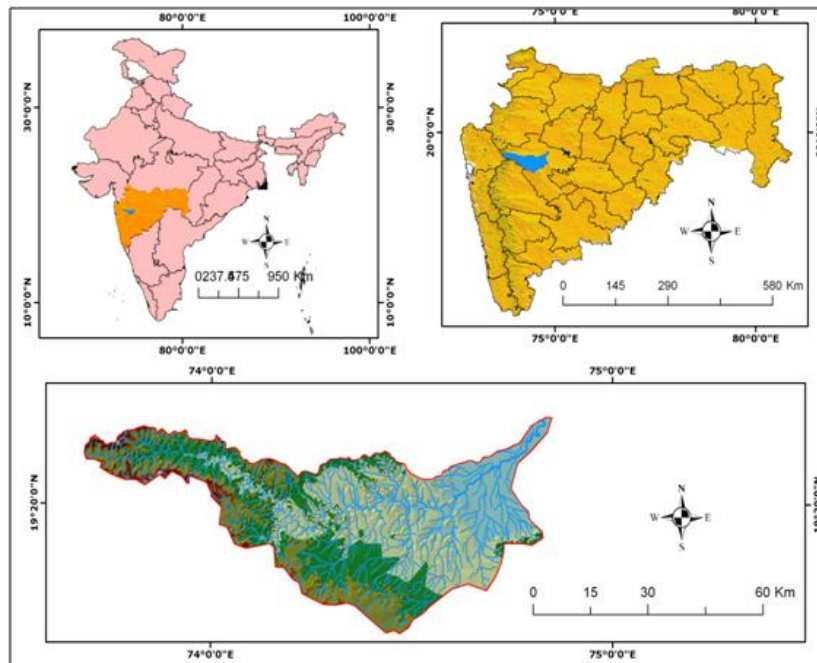
**Field/lab work covered the following aspects;**

- a) Ground truth data were collected to verify the present land use – land cover pattern and identify present Geomorphic Feature. Actual mapping were done in the field using Garmin GPS.
- b) To generate the Contour map and slope aspect map to identify the, what are the Geomorphic feature are present in the study area. What are the impact coutuere on present Geomorphic Feature?
- c) Farmers were interviewed to collect information related to what type of land use practice they are doing in last fifteen years and crops grown and to see the actual field activities.

## 1.5 THE STUDY AREA

The area selected for the study is located in Western part of Maharashtra. **Which comes under the rain shadow area water scarcity Zone, The Mula River Basin is a major tributary of Godavari River.** The area lies between 19° 02' 8" to 19° 31' 28" North Latitude and 73° 40' 56" to 74° 50' 39" East Longitude. Figure no. 1.2

**Location map of the study area**



**Fig 1.1 location map of the Mula River Basin.**

**1.6 Result and Discussion**

**• Geomorphic Features Present In The Study Area**

The present study is related to the to find out the geomorphic feature present in the study area and what are the impact occur on them due to the land use land cover and human or anthropogenic practices. The study area is characterized of different geomorphic features, and different land use land cover pattern in Mula river basin, it has been controlled the different geomorphic features from the source to the mouth. On the bnasis of physical observation by doing field work and DEM analysis In the study area there are some geomorphic features are present they are depicted in table no 3.1 and fig. no. 3.1 and 3.2.

**Table No 1.1 Geomorphic Features**

<b>Sr. No</b>	<b>Geomorphic Features orUnite</b>
1	Tope of the Hill, Plateau steps
2	Cliff area
3	Escarpment , Erosional Surface Planation surface
4	Dykes
5	Meanders
6	Waterfalls and Potholes
7	Rapids
8	V and U shaped valley
9	Colluvium
10	Alluvium
11	River Terraces or Flood plain area
12	Foot hill area
13	Bed rock
14	Mesa Butte
15	Broken land

<b>Geomorphic feature and their photo taken in the field</b>	
Photo taken near Mula dam Halley ranges 	Erosional Surface Planation surface 
Bed rock of Mula River 	Steep slope and Planation surface 
Top of the Hill near Nandur Mula dam 	Dyke at near bota hill 
Broken land near satpir dongar 	Bed rock Erosional part of Mula river Rahuri 

**Fig.2.2 Impacted geomorphic feature and their photo taken in the field**

### **3.3 IMPACT OF LAND USE - LAND COVER ON GEOMORPHIC FEATURES**

This is the our main hypothesis of our study to find out the impact of recent changes in the land use - Land cover on the geomorphic features of the study area one by one we discuss in the following

- LAND USE LAND COVER AND ITS IMPACT ON TOP OF THE HILL, PLATEAU STEPS**

Top of the hill and Plateau steps are the major geomorphic features present in the study area periphery area of the water divide line of Mula river basin, some villages are situated in the top of the

hill and Plateau steps area likewise Sakur, Mandava, Khambe, Varvandi, Pimpal dari Vankute, ambore chandanapuri and Khadakwadi, Pokhari etc All these villages are doing their routing work like agricultural practices. In this area the Land use land cover pattern is induced top of the hill and Plateau steps because people are moving and removing the soil and rock and they are flattening the area for better agriculture because of this top of the hill and Plateau steps are induced by land use land cover practiced doing by farmer. The major impact is that geomorphic processes are getting active during the rainy season and most of the top hill and Plateau steps soil is getting eroding and move to downward direction and big gulley were appear because of loosening the soil by land use land cover practices. Fig 3.3

### Top of the Hill and Land use pattern

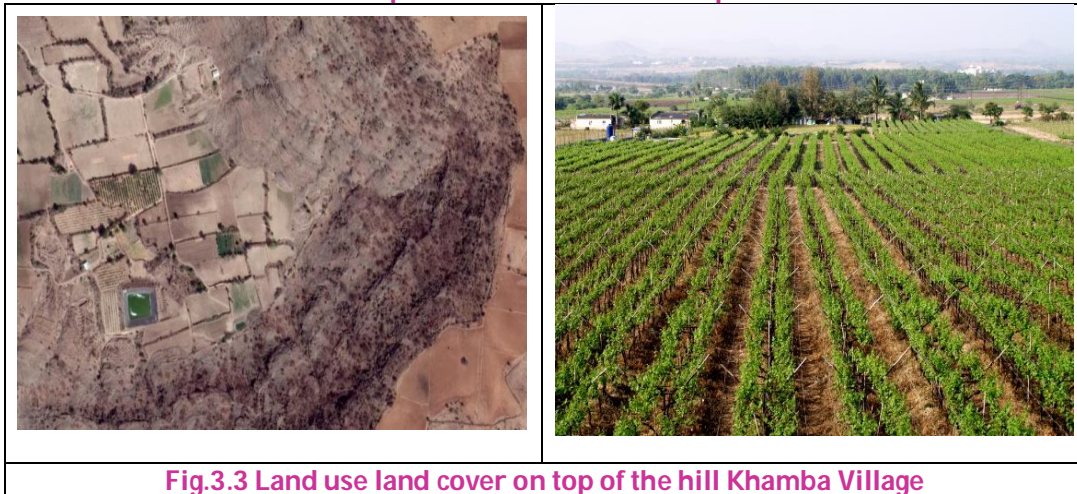


Fig.3.3 Land use land cover on top of the hill Khamba Village

- **LAND USE LAND COVER AND ITS IMPACT ON CLIFF, ESCARPMENT, EROSIONAL SURFACE PLANATION SURFACEDYKES, WATERFALLS AND POTHoles, RAPIDS MEANDER AREA**

Land use- land cover and its impact on cliff, Escarpment, dykes, waterfall and potholes is not possible because of as considering the these geomorphic feature there is very steep in slope like more than 75 degree within this slope land use- land cover never happen in the study area. As concern to the meander there is a series of meander in the study area fig.3.4 in the meander area land use pattern is more developed because of available of water as a result of this these area is under cropped area, people and farmer are bringing more area under the cropped land area because of this and there is one geomorphic process is actively work that is cut and fill activities which affected by land use land cover. Because of this impact river are gating shrinking toward its main channel and there is always one threat will be happened that is removing or wash out of fertile land or soil due to flood. As we see the Mula river is controlled by hilly ranges of Northward and Southward direction so there is series of rapids within the main channel of Mula River. In the River channel there is not possible agriculture because of parent rocks are exposed due to rapid movement of water because of that land use pattern is not developed in rapid areas.

- **LAND USE LAND COVER AND ITS IMPACT ON V AND U SHAPED VALLEY**

V and U shaped valley is major geomorphic feature in the study area. V and U shaped valley are depressed areas of land in the study area because of gravity force is high the water velocity near the V and U shaped valley are high because of this water is moving in high speed so land use land cover is induced by V and U shaped valley by flattening the u shape valley and u shape valley. Because of the erosion and weathering weathered material is transported in the valley and again transported in river channel so V and U shaped valley are getting more flattening due to vertical and lateral erosion.

- **LAND USE LAND COVER AND ITS IMPACT ON ALLUVIUM, RIVER TERRACES AND FLOOD PLAIN AREA**

These Geomorphic feature border as an active land or recharge land for the cropped. Any type of cropped we can grow in the alluvium soil because it is very fertile soil than the other soil so these type of geomorphic features are appear in LISS III images as a cultivated land and cultivated land is goes on increases from the year of 2000 to 2014 which is depicted in fig no 2.3, 2.4, and table no 2.1. The cropped land and cow grass land area are goes on increases 15.53 and 4.03 percent respectively. These classes is highly infected by land use land cover because of these are only fertile land which is getting under cropped land. From the satellite image it's indicated that that these type of soils are well developed and have good land for water holding capacity is also high. Most important thing is that is land is near about 175.28. And 54.70 sq. km out of the total area of the study. During the field work the following cropped land is observes Fig. 3.6.

- **LAND USE LAND COVER AND ITS IMPACT ON FOOT HILL AREA**

These Geomorphic feature is also goes on partially in cropped land area and some part on fallow land because where water is available that land goes under the cropped land classes and other hand where water is not available for the cropped this land is appear as a fallow land classes. That means we cannot demarked this geomorphic feature separately but this type of geomorphic feature is also goes on induced due to the land use land cover pattern and here erosion mass wearing and weathering this type of geomorphic processes is actively worked. Fig 3.7 is depicted foot hill area of the study in Mandva village.

- **LAND USE LAND COVER AND ITS IMPACT ON BED ROCK AND MESA BUTTE**

These Geomorphic feature is also goes on under the barren land class in the IIRS LISS III image this is the one of the geomorphic feature which is not induced due to land use – land cover. The slope of the mesa and butte is very steep so its not used for land use land cover, and another important Geomorphic feature is bed rock which is goes under water during the rainy season and after rainy season its exposed again this type of class is not affected by Land use and land cover practices.( Fig 1.1 and fig 1.8)



**Fig 3.8 Eroded part of Bed Rock of Mula river Basin in Rahuri**

- **LAND USE LAND COVER AND ITS IMPACT ON BROKEN LAND**

In the LISS III Image analyses from the year of 2000 to 2014 there is negative changes occurred in the broken land area. That is only because of cropped land and cow grass land area is increased. 7.64 percent area is decreases out of the total area this class is largely affected by land use and land cover system. This is a one type of colluvium present in the study area and in this area where water is available for the cropped it's getting induced by land use land cover system and from its name it's

getting suddenly eroded by water. Fig. 3.2. where water is not available these type land its more eroding during the rainy season.

#### • LAND USE LAND COVER AND ITS IMPACT ON INTERMEDIATE VALLEY

The intermediate valley is a low area between two hills or mountains typically with a river flowing through it. It is more affected by land use – land cover because it is fertile land all along the Mula River and where source of water is available there land use land cover system is inducing the intermediate valley. In this geomorphic feature all fluvial process are actively work because of that river in first segment headword, lateral and vertical erosion is carried out. And in second segment river is transporting the eroded material and in third Segment River is depositing the course of eroded material in their mouth or confluence. Therefore there are the some geomorphic features they are affected by land use land cover and some geomorphic features are not affected in the land use land cover system

#### 1.7 References

1. **Aamir Ishaq Shah et al. (2017)** Land-Use/ Land-Cover Change Detection and Analysis in Aglar Watershed, Uttarakhand. Pp- 1
2. **Allan James and Scott A Lecce (2013)** the impact of land use – land cover change on river system, book: Treatise on Geomorphology (pp.768-793) Publisher: Academic Press
3. Editors: Shroder, J.
4. **Ashebir Wolde Yohannes et al (2018)**. Land Use and Land Cover Changes and Their Effects on the Landscape of Abaya-Chamo Basin, Southern Ethiopia
5. **Ahnert, F.(1998)** Introduction to Geomorphology, London, Arnold
6. **Bloom, A., L.: Geomorphology (1998)** – A Systematic Analysis of Late Cenozoic Land forms. New Jersey,.
7. **Ang kean Hua [2017]**Land Use Land Cover Changes in Detection of Water Quality: A Study Based on Remote Sensing and Multivariate Statistics.
8. **Bharath setturu et al. (2013)** Land Surface Temperature Responses to Land Use Land Cover Dynamics
9. **Balamurugan Guru and S.M. Aravind. (2015)** Land use land cover changes in pre- and postearthquake affected area using geoinformatics - Western Coast of Gujarat, India. Pp.1-14
10. **Basanta Paudel et al. (2016)** Review of studies on land use and land cover change in Nepal. DOI: 10.1007/s11629-015-3604-9
11. **Bull, W. B., and L. D. McFadden, (1977)** "Tectonic geomorphology north and south of the Garlock fault, California". Geomorphology in Arid Regions. Proceedings of the Eight Annual Geomorphology Symposium (Ed. D. O. Doehring): 115-138. Binghamton, NY: State University of New York at Binghamton.
12. **Clauzionor L. Silva, Norberto Morales, Alvaro P. Crósta, Solange S. Costa<sup>1</sup>, Jairo R. And Jiménez-Rueda (2007)** Analysis of tectonic-controlled fluvial morphology and sedimentary processes of the western Amazon Basin: an approach using satellite images and digital elevation model, Correspondence to: Clauzionor Lima da Silva, *An Acad Bras Cienc* **79**
13. **Dr. Vikas B. Nagare (Dec. 2018)** Detection of changes in land use land cover of Mula River Basin from 2000 to 2014, Maharashtra, India (29 December 2018,) UGC Listed Journal of Research Link, Special Issue LXXX (B). Impact Factor 6. 26, ISSN-2348-7143 <http://www.researchjourney.net/SpecialIssues.php>
14. **Nagare Vikas B. (Jul 2014)** Calculating the Morphotectonic Indices of the Mula River Basin, Western Part of Maharashtra, India: A GIS Approach. Galaxy: International Multidisciplinary Research Journal ISSN 2278-9529