



DIAGNOSIS OF SOIL TEXTURE FOR SOIL EROSION RISK ASSESSMENT IN PANCHAGANGA BASIN

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ABSTRACT

Soil physical properties plays significant role in the erosion process in the specified region. Thus the present research aims to assess the soil texture as a physical characteristics affecting on the erosion severity in the Panchaganga Basin. The selected region for the present investigation is the 'Panchaganga Basin' of south Maharashtra state comprising 7 tahsils of Kolhapur district, Maharashtra. For the present investigation, data regarding various aspects of soil obtained from Government Soil Testing Laboratory, Kolhapur. The slope, stream frequency and drainage density along with the soil texture of the region is considered as a responsible factor of erosion response of the soil. The high erosion prone areas of the region mostly have coarse sand and fine sand in soil. The silt and clay soil is relatively low erosion affected.

Keywords: soil physical properties, soil texture, soil erosion, soil degradation,

INTRODUCTION

The physical degradation of soil such as soil erosion mainly alter the physical properties of soils and leading to declining its productive capacity. Hence, physical properties are analysed to know the state of degradation. The physical properties of soil are those which can be evaluated by visual inspection. Measurement of these properties can be done on the basis of some kinds of scales such as size, strength or intensity. Soil use and plant growth greatly depend upon physical properties of the soils. The anchorage that it provides to plants, penetration of roots, drainage, aeration, retention of moisture and plant nutrients are primarily linked with the physical condition of the soils (Tamhane, Motiramini et.al. 1964). The size, shape, arrangement, mineral composition, kind and amount of organic matter, volume and form of pores and occupied water etc. are factors responsible to determine the physical properties of the soils. Soil texture diagnosis carried for the analysis of the relations between the soil particle size and severity of erosion in the region.

OBJECTIVES

The present research aims to diagnose the soil texture for soil erosion risk assessment in Panchaganga basin.

STUDY REGION

The selected region for the present investigation is the 'Panchganga Basin' of south Maharashtra state comprising seven tahsils of Kolhapur district namely Shahuwadi, Panhala, Gagan-Bawada, Karveer, Hatkanangle, & Shirol (Fig. 1). The triangular tract region lies between 16^o 13' and 17^o 11' north latitude, and 73^o 41' and 74^o 42' east longitudes. It covers about 45752.2sq.km area and supports 26, 11,547 (2.6 % of state) population. The river Panchganga is well- watered and agriculturally developed part of the state (Shinde, 1973). This region is topographically complex, having river valley flood plains to the east and hilly ranges to the west. Climatically this region has temperate climate. The region located in

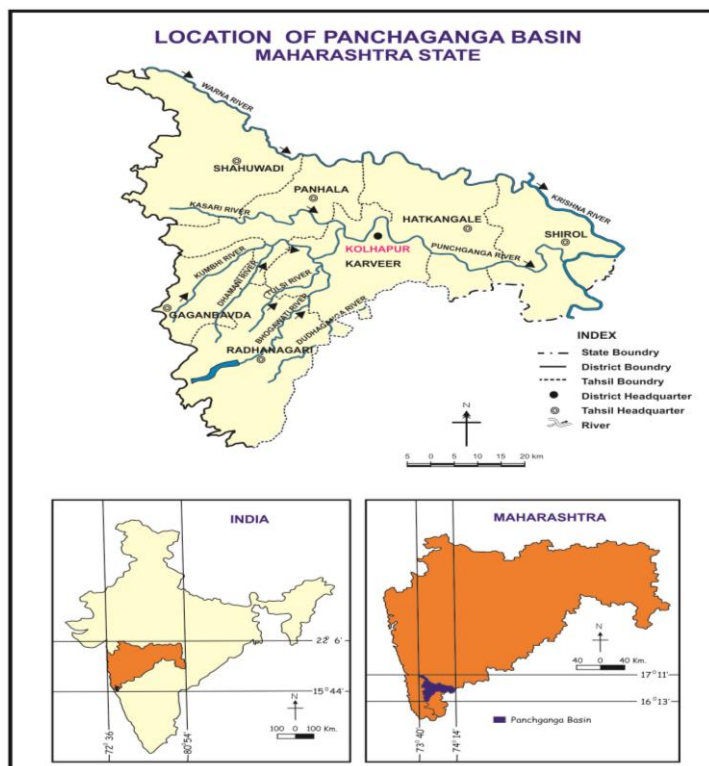


Fig. 1

slope, stream frequency and drainage density along with the soil texture of the region is considered as a responsible factor of erosion response of the soil. The correlation between other factors and soil texture is analyzed and represented with the tabular format in this research.

ANALYSIS

The relative proportion of the sand, silt and clay present in the soil is termed the soil texture. It effects on both the physical and chemical properties of the soils. The texture of the soil influences the rate at which water infiltrates and drains, along with the volume of water that would be stored at root zone and made available for crop use. These properties affect the frequency of irrigation and water to be applied. It also influences on drainage, water holding capacity, aeration, susceptibility to erosion, organic matter content, cation exchange capacity, pH buffering capacity and soil tillage, and hence it is important to understand the differences in soil texture across the region to know the state of soil and to manage the agricultural practices accordingly (Survase M.N. et al.2011).

Table 1. Panchganga Basin: Soil Texture (Area in %)

Sr. No.	Tahsil (Soil Texture)	Sandy Clay Loom	Sandy Loom	Sandy Clay	Clay Loom	Clay
1	Gagan Bawada	42.69	11.16	13.42	26.21	6.52
2	Hatkanangle	35.71	2.38	11.90	7.14	42.86
3	Karveer	25.00	2.50	7.50	12.50	52.50
4	Panhala	29.17	4.17	8.33	29.17	29.17
5	Radhanagri	27.27	13.64	9.09	31.82	18.18
6	Shahuwadi	31.33	9.12	13.16	40.83	5.56
7	Shirol	21.61	4.10	8.23	3.20	62.86
	Region	29.25	5.43	9.79	17.46	38.07

Source: Compiled and computed by researcher.

rain shadow zone of Western Ghats receives a decreasing amount of rainfall from the west (6000mm) to east (500mm).

DATABASE AND METHODOLOGY

For the present investigation, data regarding various aspects of soil obtained from Government Soil Testing Laboratory, Kolhapur, and supported by intensive field trips. Average of approximate ten soil samples results from each village in the study region, has been used as village representative of soil properties. Intensive field work has been carried out for micro level investigation. The texture properties of soils are represented by choropleth methods in map. The

The analysis of table 1 reveals that over half of the area (55.53%) is covered by clay and clay loam soils. However, its proportion varies from tahsil to tahsil. The Shirol (66.86 %), Karveer (65.00 %), and Hatkanangle (50.00 %) tahsils have high proportion of clay and clay loam soils. The silted mud by rivers and basalt formed black soils are fine in texture in lower part of Panchganga basin. The upper hilly part of region has dominance of sandy clay loam, sandy loam and sandy clay textured soils. Out of the total area 29.25% area is covered by sandy clay loam, 5.43% by sandy loam and 9.79% by sandy clay.

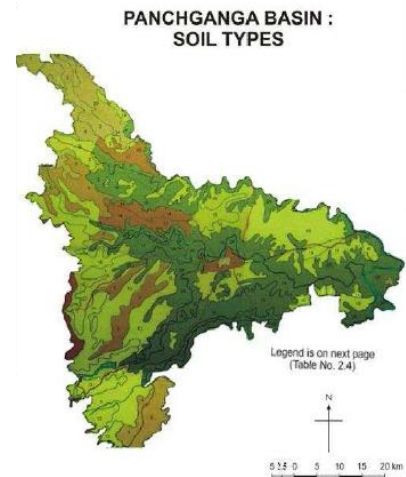


Table 2. Panchganga Basin: Soil Physical properties and Erosion Risk

Code. No.	Depth	Permeability	Texture	Slope	Relief	Stoniness	Erosion
A	Laterite						
1	Ext. shallow	Excessively drained	Loamy	Moderate	Residual Hills	Strong	Severe
2	Shallow	Well drained	Loamy	Moderate	Ridges & hill	Strong	Moderate
3	Moderate	Well drained	Loamy	Moderate	Spours	Strong	Severe
6	Very deep	Well drained	Loamy	Gently	Narrow valley	—	Moderate
7	Mod. shallow	Well drained	Loamy	Gently	Narrow valley	Moderate	Severe
8	Mod. deep	Excessively drained	Fine	Moderate steep	Narrow valley	—	Severe
9	Shallow	Well drained	Loamy	Moderate	Narrow valley	Strong	Severe
10	Very shallow	Well drained	Loamy	Moderate steep	Narrow valley	Strong	V. severe
11	Very shallow	Excessively drained	Loamy	Moderate steep	Escarpment	Strong	Severe
12	Very shallow	Excessively drained	Loamy	Moderate steep	Escarpment	Strong	Severe
19	Shallow	Well drained	Loamy	Moderate	Plain	Slight	V. severe
20	Shallow	Well drained	Loamy	Moderate	Narrow valley	Strong	Severe
B	Radish Brown						
4	Deep	Excessively drained	Fine	Moderate	Spours	Strong	Moderate
5	Shallow	Well drained	Loamy	Moderate	Spours	Strong	Severe
14	Deep	Well drained	Fine	Gentle	Spours	—	Moderate
17	Shallow	Well drained	Clayey	Gentle	Undulating	Moderate	Moderate
22	Ext. shallow	Excessively drained	Loamy	Moderate	Mesa & Bute	—	Severe
C	Coarse Shallow						
15	Very shallow	Excessively drained	Loamy	Gentle	Undulating	—	Moderate
16	Very shallow	Well drained	Loamy	Gentle	Undulating	—	Moderate
D	Medium Black						
13	Very shallow	Excessively drained	Loamy	Moderate	Spours	Strong	Severe



18	Deep	Well drained	Fine	Gentle	Undulating	—	Moderate
21	Deep	Mod. well drained	Clayey	Gentle	Plain	—	Slight
E	Deep Black						
23	Deep	Mod. well drained	Fine	Gentle	Plain	—	Moderate
24	Deep	Mod. well drained	Fine	Very gentle	Plain	—	Moderate

Source: Government soil survey and soil testing Laboratory, Kolhapur.

CONCLUSIONS

Physiographic, climatic and anthropogenic factors affect on soil texture. The undulating high slopping areas with high rainfall assist to washout the matured soils in western high elevated part of region and it is silted in plain lower part of region. Preventive measures adopted by farmers and government helps to reduce washing out the soil and maintaining soil texture.

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