



A STUDY OF SOIL ANALYSIS AND SOIL MAPPING OF KARHA RIVER BASIN

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ABSTRACT

Soil is a valuable non-renewable resource and exists throughout the World in a broad diversity. Soil is a complex, living, changing and dynamic component of the agro ecosystem.

The soil is the home of innumerable forms of plant, animal, and microbial life. A large numbers of processes are responsible for the formation of soils. Soil physical properties affect every use made of the soil.

For the present study Karha River basin has been selected. Karha is tributary of Nira River with total catchment area of near about (1357.4 sqk.m.) which is located in the south western part of Sahyadri mountain range in Pune District.

The main objective of this study is to create a base soil survey map of the Karha River Basin this Physical properties and Digital Elevation Model (DEM) data in a GIS framework. Map will be having with various attributes and boundaries of different kinds of soils on standard geographical base map. Soils have been classified according to physical properties like Sand, Silt, Clay, Bulk density. Digital soil mapping is the creation of spatial soil information systems using field and laboratory methods coupled with spatial and non-spatial soil inference systems. After the thematic layers of these data were created in Arc-GIS 9.3 software using the Physical properties of soil and then these layers were matched together to assess the soil Fertility.

Keyword: - Soil survey, soil mapping, Soil Fertility, GIS, DEM.

INTRODUCTION

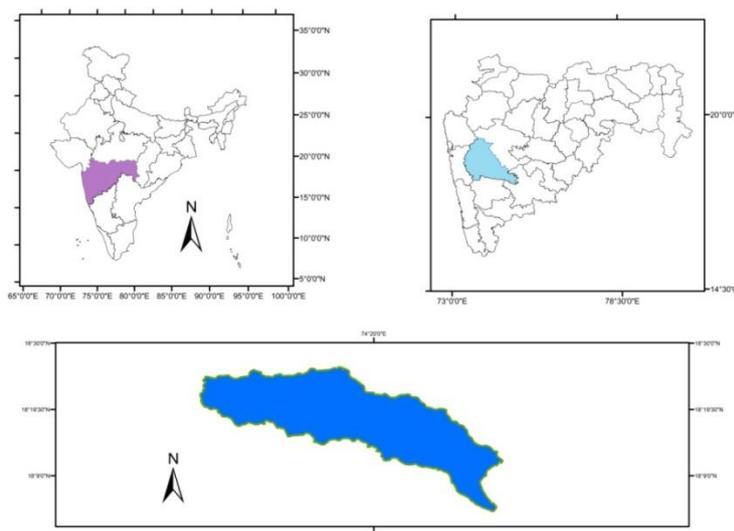
Soil mapping is techniques which produced various soil maps which are represent soil and their properties. For present paper soil mapping enable us to find co- relation between soil physical property and soil fertility. Soil fertility is the status of a soil with respect to its ability to supply elements essential for plant growth without a toxic concentration of any element. Soil productivity is a measure of the soil's ability to produce a particular crop or sequence of crops under a specified management system. All productive soils are fertile for the crops being grown. The physical properties of soil – texture, structure, density, porosity, water content, consistency, temperature and color- are dominant factors affecting the use of a soil. These properties determine the availability of oxygen in soil, mobility of water into or through soils, and the ease of root penetration. The fertility of soil is related to its capacity to produce a product. Soil fertility depends on physical, chemical, and biological characteristics.

OBJECTIVE

The main objective of the present paper is using the various physical properties of soil to analyze soil fertility of Karha basin.

STUDY AREA

Karha watershed is selected for the present study. Karha drainage basin is located in the southwestern part of Sahyadri mountain range in Pune District. The Karha river is one of the major tributary of the Nira river. It is a tributary of Nira River. Karha River flows from askrwadi and confluence of Karha with Nira River at near Sonagaon. Malharsagar dam is built upstream on this river. The study area lies in between 18°02'20" North to 18°06'10" North latitude and 73°04'20" East to 74°04'10" East longitude. The Karha river basin covers an area of (1357.4 sqk.m.). The length of river Karha is 89 km The Karha River is one of the important sources of water of this region.



DATABASE AND METHODOLOGY

The entire study is based on both primary and secondary data. For secondary information, several government institutions, private organization, libraries and related administrative sectors etc. are used.

Pre – field Method:

1. Collection of Toposheets (47F/11,47F/12, 47F/15, 47F/16, 47J/3) having scale 1: 50,000.
2. Planning for Field work.
3. Collection of available literature related to geology, relief, slope, climate, vegetation, irrigation, production etc.

Field Method:

1. Observation of the drainage pattern.
2. Collection of soil sample.
3. Study of the cropping pattern.

Post – Field Method:

1. Analyze soil samples in soil laboratory.
2. Determination of soil's physical properties like soil texture, soil density, moisture contain, water holding capacity, bulk density, porosity, soil volume, etc.
3. Correlation and analysis of soil properties and fertility of the study area.

Software used for data processing:

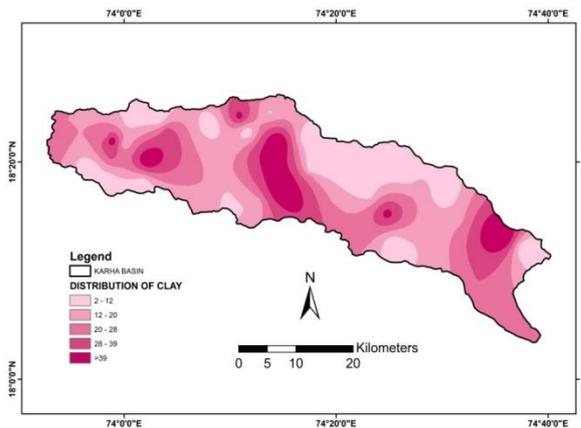
- Arc GIS version 9.3 Geographic Information System (GIS) software was used for creating, managing and generation of different layers and maps.
- Google Earth pro 4.2.
- Global Mapper
- The Microsoft Excel was used for mathematical calculations.

RESULTS

Soil Texture

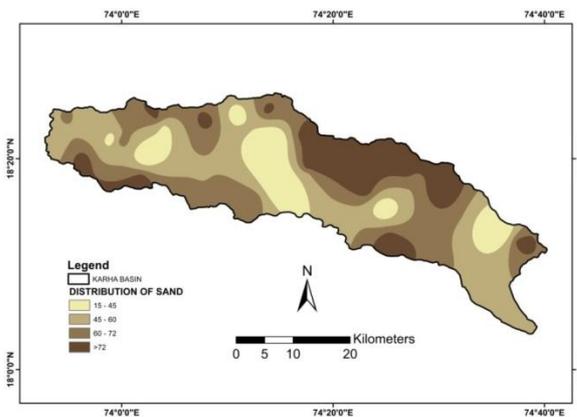
Texture refers to the relative amounts of differently sized soil particles. Soil texture depends on the relative amounts of sand, silt, and clay. Soil texture is important factor which effect on soil fertility. Clay is a fine-grained soil that combines one or more clay minerals with traces of metal oxides and organic matter. Clay is an important reservoir of

plant food. Following map express clay distribution of Karha Basin. Middle part of Karha basin shows concentration of clay soil hence sugarcane is dominant crop.



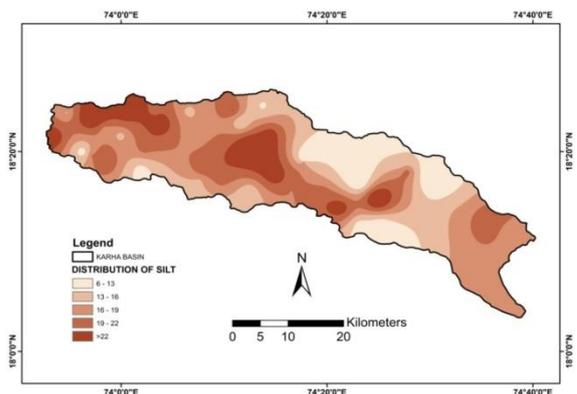
Class	Area (sq.km)	Area(%)
<2-12	301.04	22.18
12-20	427.51	31.49
20-28	376.14	27.71
28-39	156.45	11.52
>39	96.26	7.09
Total	1357.4	99.99

Following map express sand distribution of Karha Basin. North east part of Karha basin shows concentration of sand soil which affected fertility of soil of this area.



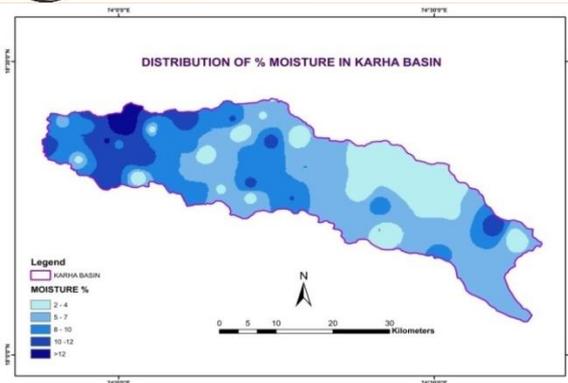
Class	Area (sq.km)	Area(%)
<15-45	190.24	14.1
45-60	494.63	36.44
60-72	417.21	30.74
>72	255.32	18.81
Total	1357.4	100

Following map express silt distribution of Karha Basin. Western part of Karha basin shows concentration of silt soil which affected fertility of soil of this area.



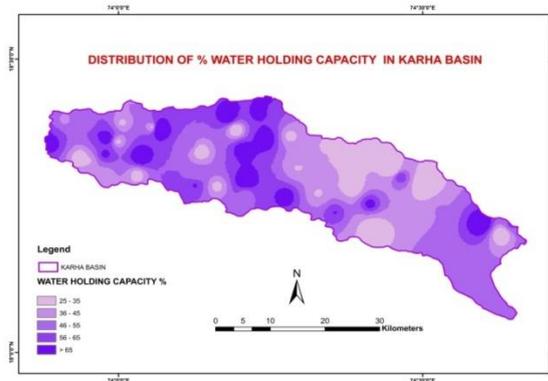
Class	Area (sq.km)	Area(%)
<6-13	206.63	15.22
13-16	277.63	20.45
16-19	425.18	31.32
19-22	298.93	22.02
>22	149.3	10.98
Total	1357.4	99.99

Following map express Moisture percentage of Karha Basin. At the confluence point of Nira and Karha shows high percentage of Moisture, which is helpful to growth of crops.



Class	Area (sq.km)	Area(%)
< 2 -4	778.88	57.38
5 -7	521.24	38.40
8 -10	41.40	3.05
10-12	12.48	0.92
>12	3.39	0..26
Total	1357.4	100

Following map express water holding capacity of Karha Basin. Fine textured soil have a greater occurrence of small pores that hold water against free drainage, resulting in a comparatively higher field capacity.



Class	Area (sq.km)	Area(%)
< 25 -35	86.84	6.40
36 -45	516.52	38.05
46 -55	596.90	43.98
56 -65	146.54	10.80
>65	10.58	0.80
Total	1357.4	100

CONCLUSION

In Karha Basin, acidic and alkaline type soil is found mainly. Slightly acidic soil is good for vegetable, grains, trees and grasses. Hence in Karha basin, production of crops like onion, wheat, Harbhara, cabbage is maximum. In Karha basin sandy loam soil mostly observed. Available water capacity is affected by soil texture, presence and abundance of rock fragments, and soil depth and layers. Available water capacity increases with increasingly fine textured soil, from sands to loams and silt loams. In Karha basin water capacity increases with increasingly fine textured soil, from sands to loams and silt loams. Coarse textured soils have lower field capacity since they are high in large pores subject to free drainage.

There is a strong positive correlation in productive soils between fertility and physical properties.

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