CHAPTER - I

INTRODUCTION

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1.1 THE PROBLEM :

Land is one of the most important components of the life support system which has been used by mankind over centuries. This increasing pressure of population on the utilization of land resources has threatened the ecosystem resulting in the environmental degradation. Moreover, crop land is loosing fertile top soil cover. This leads for the spatial imbalance in the capability of land for plant growth. Therefore, there is need to have thorough investigation of such valuable national resource. The study pertaining to land capability classification is an essential tool for agricultural planning.

Landuse is the use of partial land for the general purposes and land capability is the inherent capacity of land. The valuation of land is done on the basis of soil characteristics and slope as both are more important factors influencing the use of land. Hence, a detailed analysis of soil and slope is strongly required for rational use and conservation of land. The landuse study is of immense value in tracing the past landuse and it's future trends. This kind of inventory may help to bring uncultivated land under production and the efforts will be oriented to maximise the agricultural produce. Besides, landuse and land capability studies at micro-level, would be helpful for the development of land resources. This also requires a detailed knowledge of land with it's physical characteristics, capacity and limitations. The present study

deals with landuse and land capability classification in Khatav taluka of Satara district.

The term 'land capability' is variedly defined, " The land capability is by and large ascertained by inherent soil characteristics, external land features and environmental factors limiting landuse," (Mohammad Noor, 1981).

" The land capability classification is a scientific appraisal of the physical characteristics of land," (Singh and Dhillon, 1984).

The land capability is dynamic phenomena and hence there exists a need of an efficient landuse evaluation and monitoring system (R.Mohan and K.P.Gupta, 1985). The land capability classes are changing with the use of modern farm technology. This calls for periodical assessment of land capability which may be fruitful for adopting soil suitability classification.

1.2 SELECTION OF THE REGION :

In the present work the study of landuse and land capability is confined to the administrative unit i.e. Khatav taluka in Satara district of Western Maharashtra (Fig.1.2) covering 1319 sq.kms geographical area with 202,701 population (Census 1981). It is the part of Deccan plateau with the average height of 700 mtrs ASL and the topography is characterised by the presence of rugged hill ranges on the eastern and western

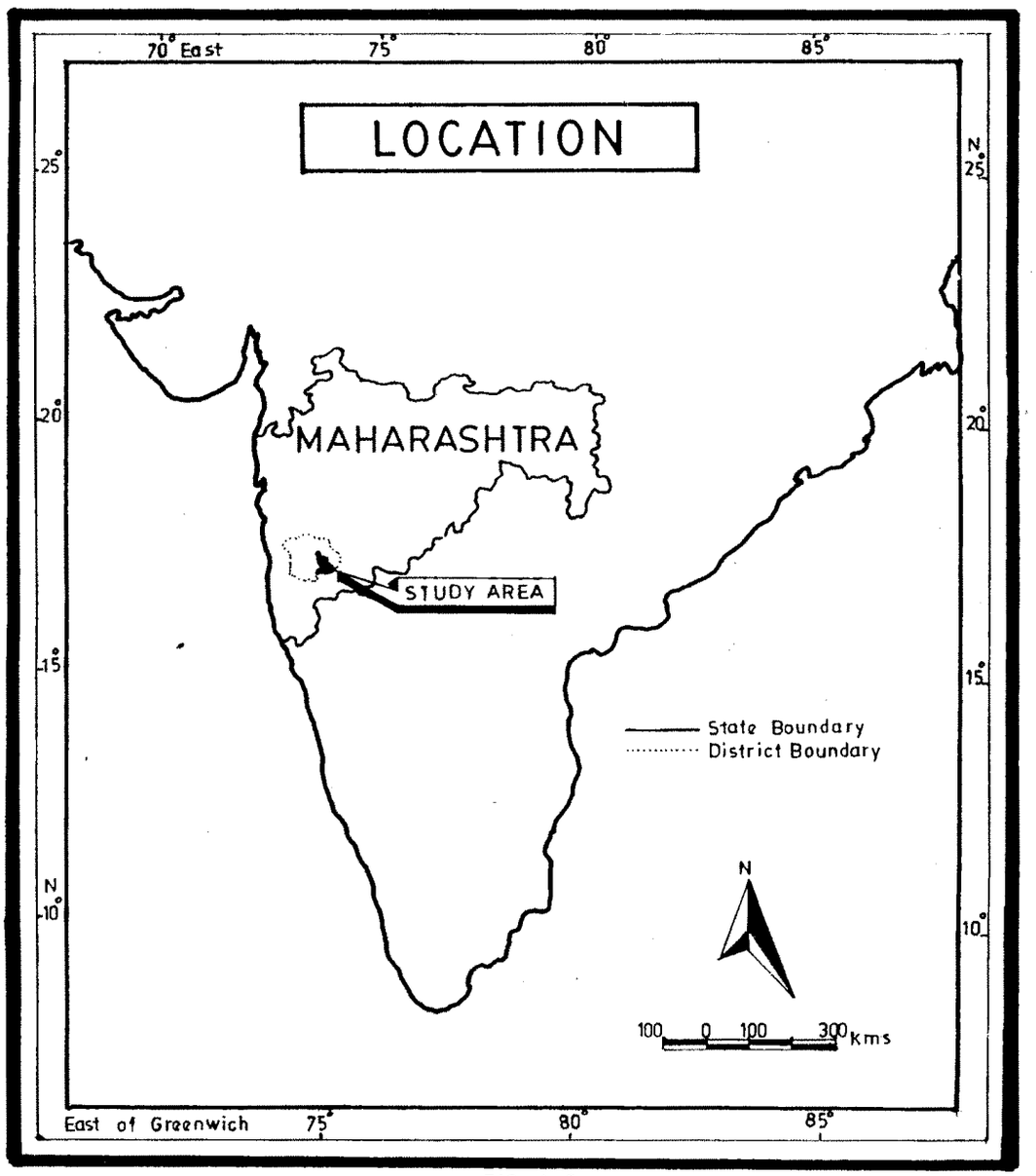

LOCATION
70° East
75°
80°
85°
25°
20°
15°
N 10°
N 25°
MAHARASHTRA
STUDY AREA
State Boundary
District Boundary
N
100 0 100 300 Kms
East of Greenwich

FIG. 1. 2

borders separated by Yerala basin which brodens southwards (Fig.1.3). Climatically the region has semi-arid conditions. The taluka is located in rainshadow belt with poor reliability of rainfall keeping agriculture always in the risk. The region possesses poor brown soils which are defficient in various nutrients. A narrow belt of alluvial soils is, however, confined to the banks of Yerala river. The region experiences inadequate supply of both surface and underground water. The river Yerala is the master stream which is seasonal in nature.

The selection of the region is attempted on the following ground :-

i) The author is well aquainted with the region as it is his home taluka. This has led for the collection of relevant data.

ii) The agricultural land dominates the landscape which is marked by spatial variations.

iii) The geographical study of landuse and land capability of this region has not been attempted.

iv) The region's agricultural productivity is poor which needs to be increased. This calls for a detailed assessment of land capability classification.

1.3 OBJECTIVES OF THE STUDY :

The main purpose of the study is to map and analyse spatial pattern of landuse and land capability of Khatav taluka.

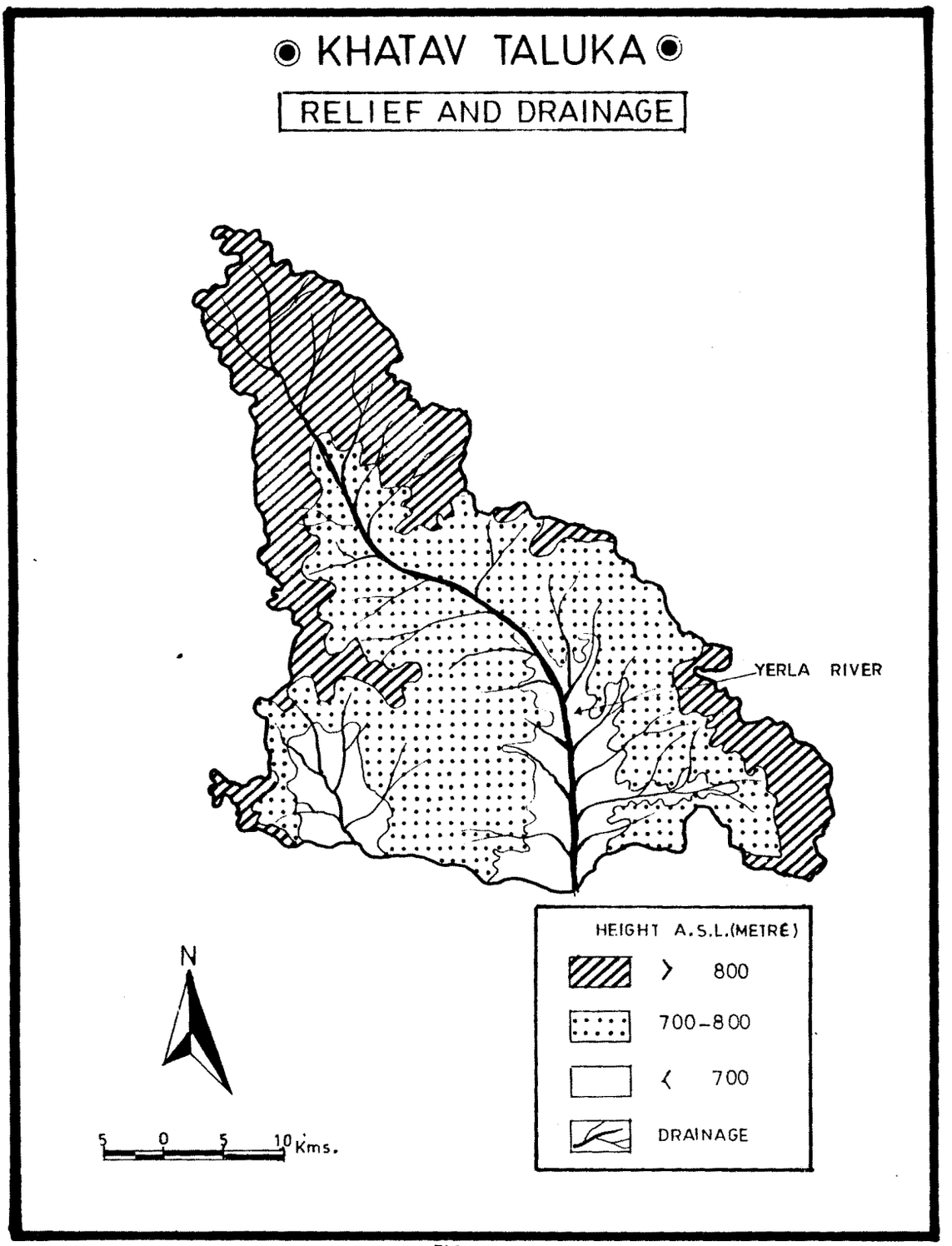

KHATAV TALUKA
RELIEF AND DRAINAGE
YERLA RIVER
HEIGHT A.S.L.(METRE)
> 800
700-800
< 700
DRAINAGE
N
5 0 5 10 Kms.

FIG. 1.3

However, following are the specific objectives of the present study.

i) To examine physical characteristics of soils in the region.

ii) To map and identify the land capability classification of the study region.

iii) To assess the land capability classification at micro-level.

iv) To study general landuse and propose landuse planning.

1.4 DATA BASE AND METHODOLOGY :

The data were collected both from primary and secondary sources. The data pertaining to general landuse were abstracted from the secondary sources such as published records in the form of socio-economic reviews and district statistical abstract (1985) and census handbooks (1971 and 1981), Satara district, published by the Government of Maharashtra.

The primary data were collected through villagewise field surveys. The stratified random sampling technique was employed to select sample villages regarding general land capability of the region. The field enquiries were attempted to obtain the information from the farmers. The attention was also paid to assess different characteristics of soils as follows.

i) Soil texture was assessed by talling it with soil texture diagram (Fig.1.4-A) in soil survey manual as evolved by Agricultural Department, Government of Maharashtra, 1981, during the field observation.

ii) Soil depth was identified by observing soil profile along the river, stream banks and roadside cuttings.

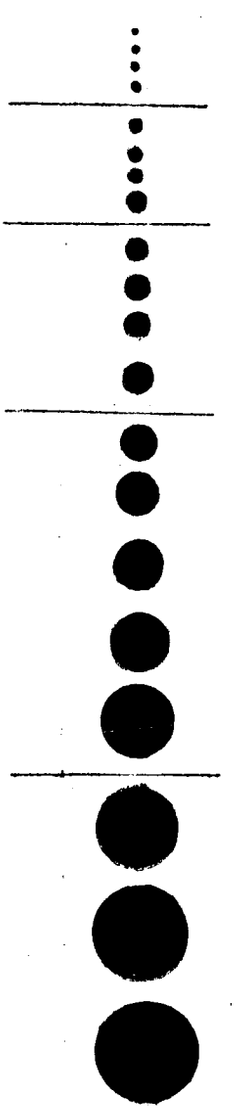
iii) The colour of top soil was assessed by a careful observation in the field.

iv) Soil gravelness was assessed by the amount and size of gravels.

v) The soil moisture capacity was tested by using 'Core Roll Molding' method.

The toposheet Nos.47 $\frac{K}{1}$ to 47 $\frac{K}{11}$ with the scale of 1:50,000 were used to analyse drainage texture, a parameter, for determining erosion proneness of the region. The standard slope analysis technique developed by Wentworth (Monkhouse and Wilkinson,1971) was employed to determine average slope. Thus, the collected data were processed by using the statastical procedures and same have been represented through maps. The details of various techniques are explained at appropriate places in the text. The village is considered as a unit of study for the entire region (Fig.1.1) whereas the plot is micro-unit for studying land capability within the case study villages. The period for landuse study extends from 1971 to 1981 and the year 1989 is considered to study land capability.

(A) SOIL TEXTURE DIAGRAM



SOURCE SOIL SURVEY MANUAL
AGRI. DEPT. GOVT. OF MAHARASHTRA

(B) SLOPE DIAGRAM

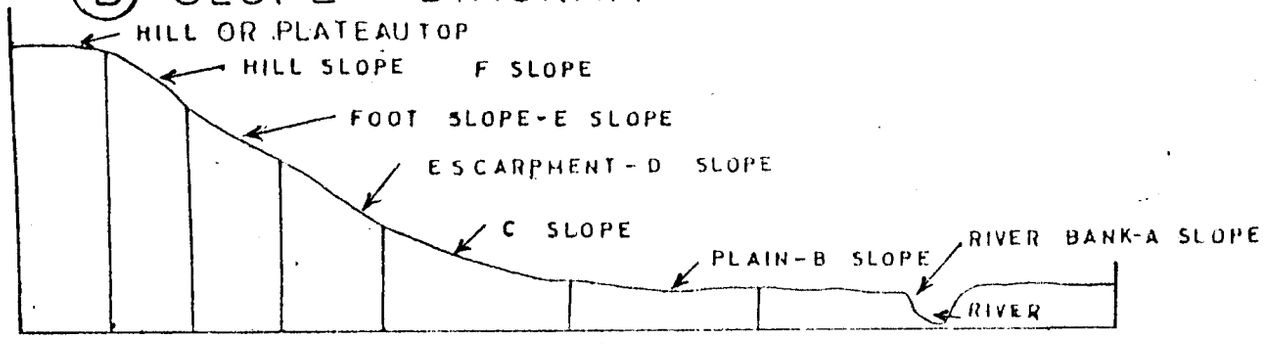


Fig 1.4

The various methods have been employed for the land capability classification in different parts of the world. They are Morgon's method (1939), based on the degree of adoptation of land types to various crops; Stories's method (1933) of land rating; Bennett's method (1939) based on crop yield; Stamp's (1954) P.P.U. method; Unit area method and U.S.D.A's method. In India, All India Soil and Landuse Survey Organization (IARI) has modified the U.S.D.A's method and this modified U.S.D.A's method is used in the present study. It has recognised eight land capability classes as follows :-

Land suitable for cultivation :

Class I :

This is very good land that can be cultivated safely with ordinary good farming methods. It is nearly level land (slope less than one percent). It has deep, easily worked soil and it is subject to only slight erosion. It is well drained and is suited for intensive cultivation.

Class II :

It is good cultivable land but has some limitations of gentle slope, moderate erosion, moderate depth etc. and each of these limitations requires special protection.

Class III :

This land is moderately good which is characterised by i) moderate steep slope ii) high susceptibility to erosion

iii) shallow depth iv) sandy or gravelly with low moisture capacity.

Class IV :

It is fairly good land suited forlimited cultivation. It is shallow or moderately deep, moderately or strongly sloping and low in fertility. Thus, it's cropping use is restricted by unfavourable soil characteristics.

Land not suitable for cultivation :

Class V :

This land is not suitable for cultivation, but it is suited for grazing. Cultivation is not feasible because of wetness, stonyness or some other limitations. The land is nearly level and is subject to slight erosion. It occurs in many swampy areas that cannot be drained easily.

Class VI :

It is too steep, subject to erosion, shallow, wet or dry. So it is fairly well suited for grazing or forestry but not for arable farming.

Class VII :

This land is very steep, eroded, stony, rough, shallow and is recommended for grazing or forestry.

Class VIII :

It includes such areas as bad lands, deep gullies, high mountain land and very steep, rough and stony barran land. It is suited only for wildlife, recreation or water-shed protection uses.

1.5 THE LITERATURE SITED :

Many works on the landuse and land capability classification have been carried by the scholars. Recently the author has gone through some literature related to land capability classification.

P.Das and R.Bhattacharya (1978) held the view that land capability classification was a scientific appraisal of physical attributes. They took into account the use of inorganic fertilizer as the only economic consideration in their study. They concluded that the menace of frequent flood conditions mask the inherent capacity of soil to some extent. S.C.Sharma and R.Sharma (1980) attempted " Land capability classification and landuse planning of Padrauna Block in Deoria District of U.P." They considered external land features like topography, drainage, angle of slope, stonyness and degree of limitations and other environmental factors while classifying the soils.

N.Rao and R.Vidhyanadhan (1981) studied landuse capability with the help of areal photographs of Krishna delta. They observed that the study of landforms, soil characteristics and existing

landuse patterns coupled with the knowledge of certain limitations imposed by some physical and socio-economic conditions has helped to classify different kinds of lands of the Krishna Delta to their capability levels, necessary for regional planning and developmental purpose.

K.S.Sohal (1983) in his article "Nature and classification of soils in the Ghagger Saraswati plain" considered the physical and chemical properties of soil and artificial drainage (irrigation facilities) while classifying the land capability. R.R.Singh (1985) classified the soils on the basis of fertility and productivity in Manipur Valley. R.R.Sharma attempted to measure the quality of land based on physical and chemical characteristics of soils and socio-economic considerations of land in Chattisgarh District. Accordingly he classified soils of this district into four groups. R.Mohan and K.Gupta (1986), used landsat data for land classification which was useful for management of environment.

1.6 PLAN FOR THE CHAPTERS :

The present study of landuse and land capability classification in Khatav taluka is divided into six chapters. The first chapter deals with the significance of study associated with the selection of study region, objectives, sources of data, methodology and literature sited. Physical characteristics of soils are the subject matter of second chapter. The land

capability classification and it's analysis have been attempted in third chapter. Chapter fourth is concerned with the case study (micro-level) of six villages. The discussion on landuse and landuse planning is attempted in chapter five. An attempt has been made for the general conclusions in the last chapter.

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