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Chapter II

PERSONALITY OF THE REGION

1.1 INTRODUCTION:

In the first chapter, meaning of agriculture, agricultural Geography, Place of agriculture in Indian economy, agricultural development in India, choice of the region, aims and objectives, data base and metdology, review of literature and chapter scheme these points are discussed. This Chapter is mainly concerned with location and boundaries, historical background, physiography, geology, coastline, drainage, climate, soil types, and natural vegetations of the study region.

2.2 LOCATION AND BOUNDARIES :-

The lingustic state of Maharashtra was politically evolved on the first May 1960 as a late consequence of the state recognition Scheme of the Government of India. Commanding a more or less central situation in the Republic of India Maharashtra is the third largest state in the Republic, both in population and in area.

Maharashtra extends 15° 4' North latitudes to 22° 6' North latitudes and 72 36' East longitudes to 90 54' East longitudes. The state is about 800 Kms from east to west and 700 Kms from north to south. It has a total land area of 307,713 Kms and proportion as compared with India
is about 9.36%. Politically, the state is made up of 31 districts grouped into six administrative zones, Konkan, Pune, Nasik, Aurangabad, Amravati and Nagpur. Agriculturally the state is divided into eight divisions viz. Konkan, Nasik, Pune, Kolhapur, Aurangabad, Latur, Amravati and Nagpur.

Territorially Maharashtra has Gujarat to its north-west, Madhya Pradesh to its north and east, Andhra Pradesh to its south east and the state of Goa and Karnataka to its south. Arabian sea is located at the west side of the state.

There are 325 tahsils in the Maharashtra state. There are 336 cities and towns in the state. There are 40,412 inhabited and 2,613 uninhabited villages in the state.

2.3 HISTORICAL BACKGROUND :

Well protected by the Ghats to its west and the Satpuda and Vindyas to the north, the Deccan table land witnessed more or less stable Kingdom during early and Medieval periods. The eastward spurs of the Ghats helped to divide the table-land further into smaller independent Kingdoms that lived in relative isolation, peace and safety, throughout the Hindu period. The Satvanas, the Traikutakas, the Vakatakas, the Kakchuri dynasty, the Chalukyas, the Rashtrakutas and the Gadavas along with Vassars administered the area in succession with a loosely knit central authority. Between the 14th and 16th centuries the Bahamanis ruled over the area,
and after their fall, Maharashtra fell into fragments with independence rulers ruling from Bijapur, Golkonda, Bidar, Burhanpur and Ahmadnagar. The chaos and turmoil that ensued during this period at last ended with the establishment of the Maratha Empire by Chhatrapati Shivaji. The rising power of the Marathas during the Peshwa period inherited the Mughal authority in Deccan and extended it further beyond. Though never unified under a powerful organisation, the Maratha period constitutes an important landmark from the viewpoint of the present political and administrative framework.

The constant struggle between the Marathas, the Moghuls and the Bahamanis helped the British to gain a foothold in Western India which they further strengthened and extended in one enveloping movement with the weakening and crumbling of the Maratha power during the late eighteenth and early nineteenth centuries, since the political annexation by the British in early nineteenth century, minor territorial and administrative changes have continued even till today. But only since 1960, the territorial extent of the state has coincided with linguistic limits.

From the foregoing historical account, it is evident that regional diversities in relief and landforms, in climate and vegetation and in historical events have brought into play a regional differentiation in the landscape, economic development and element of culture. Administrative differentiation into British districts and Indian states during the pre-independence days has further added colour to this variety.
2.3 PHYSIOGRAPHY :-

Physiography is one of the dominant parameter of physical environment and its impact on patterns and density of agriculture is immense. The study of the influence of environment upon the nature and distribution of crops and livestock is of prime importance in agricultural geography. Nature with its physical characteristics provides a host of possibilities for agriculture in different areas.

The framework of the physical setting of Maharashtra is simple; a vast plateau sloping eastward, and bounded by hills and mountains to the west and the north and narrow coastal low land to the west. Maharashtra falls into the following relief division.

i) The Sahyadris and its transverse ranges

ii) The Maharashtra plateau

iii) The Northern hills of the Satpuda system

iv) The Tapi-Purna lowlands


vi) The Konkan coastal lowlands.

(i) THE SAHYDRIES AND ITS
TRANSVERSE RANGES :-

The Sahyndries or the western Ghats, with an average height of 1200M; runs southwards along the western edge of the Deccan plateau from near the Tapi mouth and extends much further beyond the southern limits of the state. It overlooks the Arabian sea on the west and runs more or less parallel to the coast at a “Stone throw” distance of 30 to 60 Kms from the sea. Viewed from the east, the range seems cut up into terraces but from the west coast it looks like a sheer wall. It appears like an ancient sea-cliff, rising almost perpendicularly from the coastal low-lands upto 1,000 metres in places.

It may also be a fault scarp, and the part to the west of it may have either drifted away further westwards or subsided to form the sea-floor.

The crestline of the Ghats runs in broad curves forming two- re-entrants at Tryambak and Tamhini carved by the headwaters of the Konkan rivers, the Vaitarna, and the Savitri respectively. Higher elevation occur mostly in the north, the ridge descending in heights southwards. The range is without a break in its entire length, except for a few gaps or ‘ghat’ that have served in the past as a routes linking the coast with interior. Of these, the Thal and the Bhor ghats are the most important being the routes used by the roads and railways alike to gain access from the city of Mumbai to the rich hinter lands of the interior. A few other minor gaps like the Nana ghat, the Kumbharli and Amba passes and the Phonda ghat are more difficult
of access and used locally for the coast - to - inland for traffic and commerce.

The Ghats carry at their tops, huge plateaus that are almost flat. Mahabaleshwar (1438 M.) and Harichandrarghat (1424 M.) are the most important of them. Two peaks rise to higher elevations. Kalsubai (1646 M.) near Igatpuri and Salher (1567 M.) about ninety Kms. north of Nasik. A number of spurs and ridges shoot off to the west and descent down to the sea often forming rocky headlands and promontaries jutting into the sea.

Eastward too, three main ridges branch off within the limits of the state. The Mahadeo branches off from the main ridge about 18° North latitude and runs south-east; another ridge, called the Harischandra rghat in its western parts and the Balaghat range in the east, branches off from about 19° 30' North latitudes and runs in a south east direction as far as Hyderabad in Andhra Pradesh. Further north of the Harishchandrarghat range, there runs a series of detached hill masses west to east, cutted the Ajanta range.

(ii) MAHARASHTRA PLATEAU :-

The whole of the Maharashtra plateau is formed of plateau basalt. The ground rises westwards through a series of low hills to the high peaks and Mesas of the Sahydris. The slope, eastward, is rather gentle; about a metre per kilometer. The plateau is deeply dissected by the eastward
flowing Godawari, Bhima, and Krishna and their tributaries. The 300 metre contour line may be taken as its northern and eastern boundary.

The plateau falls in height to less than 300 metres both towards the north and the east. The northern area, flanked by the Satpudas to its north and the Deccan plateau to its south is an alluvium filled valley drained by the westward flowing Tapi and its tributaries. There is heavy concentration of agricultural activities in the river valleys of Bhima, Krishna, Panchanga and Godavari over Maharashtra plateau.

(iii) THE NORTHERN HILLS OF

THE SATPUDA SYSTEM :-

The Satpudas lie mostly outside the northern limits of the state, but parts of its high, craggy, sharp-crested ridge occurs in the west in the district of Dhulia and again as Gawilgad hills in the northern parts of Amravati. In the western parts, it is arcuate in form, 20 to 40 Kms. in width. The Toran Mal is a small plateau here, rising to 1,150 metres, but the highest peak is Astamba Dongar (1,325 M.) overlooking the Tapi valley. Several of its shownits rise above 1,000 Metres and the highest peak in the Satpudas within the limits of the state occurs at Vairavghat in the Gawilgad hills. The southern slopes of these ranges fall abruptly from a height of about 1,200 Metres to below 300 Metres and the cliffs run northeast for a long stretch. The rectilinear trends of the scarp fall here indicates that faulting was partly
responsible for the steep scarp.

(iv) TAPI PURNA LOW LAND :-

The Tapi-Purna rift with its westward orientation is an alluvial infilled valley, bounded both to its north and south by almost straight running scarps, suggestive of the fault planes of the Satpuda and Ajanta ranges.

It is only in the lower reaches of the Tapi in Dhulia and Nasik that the scarp line is broken and is replaced by a number of low hills and plateaus of the Chandor hill group. The valley proper, with a gentle slope westwards has no hills. To the north of the Tapi and the Purna at the foot of the Satpudas and Gawilgad hills have developed extensive piedmonts, with a shallow watertable, coarse soils and open texture; this piedmont is badly furrowed into a ravine land by numerous gullies and streams. The whole basin can be sub-divided into four units, on the basis of drainage and economy.

(a) The Purna basin or the Payanghat of Berar plains occupying the plain talukas of Amravati, Akola & Buldhana districts.

(b) The Tapi valley in the central parts of Jalgaon and Dhulia.

(c) The Tapi valley west, in the hilly section of western Dhulia.

(d) The Girna basin of Malegaon plateau in the southern Dhulia and
Northern Nasik.

(v) THE WARDHA-WAINGANGA PRANHITA

ALLUVIAL LOWLANDS :-

The Wardha-Wainganga-Pranhita basin, draining ultimately into the Godawari along the state's border with Andhra Pradesh to the south of Gadchiroli district is a distinct unit in the state is non-continuous with the Godavari basin proper. A number of offshoots run-eastwards from the main Satpuda range across Nagpur and Wardha districts, forming the water divide between Pench, Kanhan, Wunna and Wardha drainage. The Tekari peak is on one of these spurs in Nagpur.

(vi) THE KONKAN COASTAL LOWLANDS :-

Extending from Daman in the north to the Terekhol creek in the south for a distance of about 650 Kms. to west of the Sahyadris is the Konkan coastal lowlands. It is lowland, but not plain. The Ghats that present their steep scarps to the Konkan limit the width of the coastlands is 20 to 40 Kms. close and to the north of Mumbai, the Ghats and its outlier, the Matheran ridge recede comparatively inland making these lowlands the widest in the entire Konkan coast- about 100 Kms. Numerous low hills dominate the relief of these lowlands. A number of small and rapidly flowing rivers like Vaitarna, Tansa, Gad, Sukha, Kajali, Vashi-Shti, Savitri, Ulhas, Patalganga, Kundalika, Karli and Terekhol run from the Sahyadri ranges and join the
Arabian sea. The Konkan lowlands are more favourable for the development of horticulture. Maharashtra has 720 Kms. coastline along Konkan.

2.5 GEOLOGY :-

In general, the most important geological formation is the Deccan trap which covers practically the whole of Maharashtra state. The basalt rocks of Deccan belong to the Vedic (Archan) period and consist mainly of granite, gneisses and schists.

In Maharashtra, however, they do not occur except in small tracts in the southern and eastern parts of the state, at the basement plateau is covered by rocks of later ages. This archean basement complex consisting of unclassified crystalline greisses and schists occur in Chandrapur, Bhandara, Gadchilori, Nanded and in some parts of Ratnagiri district. Along the extreme eastern parts of Chandrapur, Gadchiroli and Bhandara to the east above mentioned crystalline formations, there occur rocks of porphyritic granite in the form of a huge batholith.

Rocks of igneous origin are associated highly metamorphosed and folded sedimentary formations known as the ‘Dharwar series’. These rocks in many places lie uncomfortably over the archicans and consist of mostly granulites, dolomite marbles, mica, sillimanite and hornblende schists.

In the eastern Nagpur and Northern Bhandara region, these beds are known as ‘Sausar series’, ‘Chilpi ghat beds’, and ‘Gondite series’ they carry
rich Manganese deposits. The Cuddapah system, occurs in Maharashtra in two parts, one in the south and another in the east. Known locally as the Kaladgi series, it occurs in two small outcrops near Nesari and Gadhinglaj in Kolhapur district. It is mostly composed of quartzites, shales, limestones and breccia. Geological formation played important role in the formation of various soils in the Maharashtra.

2.6 DRAINAGE :-

Drainage is a comprehensive expression in geography. It includes surface as well as underground water flow of water. It is the results of a combination of numerous factors including climate particularly precipitation, insolation, humidity, cloudiness, windforce and direction, structure and type of rocks, vegetation, soil and human utilisation, human obstructions to natural water-flow such as roads, railways, dams and reservoirs also change its nature. However, drainage is one of the most important component of physical environment which affects agriculture directly and indirectly. Ground water effluent becomes the base flow that maintains the flow of streams in fair weather. When we speak of surface water we mean stream flow regardless of its source. Therefore, surface water is by far the most important means for providing substantial irrigation which stabilizes and improves agro-economic life in an area that has otherwise plenty of land potential. Because of the uncertainty in the flow of surface water, it is probable that any attempt to improve agricultural techniques and land-use planning without combating the problem with the help of shallow and deep water tables is bound to
be absorptive.

(i) **RIVERS:**

The rivers of Maharashtra fall under three groups:

(a) The Deccan rivers and their tributaries that drain down the plateau slope eastwards;

(b) The Tapi-Purna system that drains west against the plateau slope and;

(c) The short but swift Konkan rivers, that drains into the Arabian sea.

The Western Ghats and to a lesser extent, the Satpudas-Maikal ranges constitute the primary water sheds, while the transverse ranges like the Ajanta-Satmala, the Balaghat and Mahadeo ranges form the secondary watersheds from which many of the tributaries of the Deccan rivers rise.

The watershed on the Western Ghats lies close to the Arabian sea coast. Its position in the old and stable Deccan plateau is a matter of controversy among the geologists, on account of its asymetrical location with reference to the two seas. The long rivers that flow through the Maharashtra plateau eastwards belong to the Godavari, Bhima and Krishna systems respectively from north to south.
(a) GODAVARI:-

The Godavari rises in the Tryambak hills near Nasik and flows east and southeast for a distance of about 800 Kms, through the state before entering into Andhra Pradesh. The basin covers a total area of a lakh Sq. Kms. within the state limits. It runs forming a boundary between the Aurangabad, Ahmednagar, and Bhir districts before flowing across the Parbhani and Nanded districts into Andhra Pradesh. Again in eastern Maharashtra, it forms the southern boundary of Chandrapur and Gadchiroli districts. The Godavari has many tributaries both on its right and left banks draining many of the central and eastern districts of the state. Approximately the drainage basin of the Godavari falls between the Balaghat ranges in the south and the Ajanta Satmala group of hills in the north. The right bank tributaries of the Godavari are Darna, Pravara, Sindphana, Manjara, are the most important of them. Of the left bank tributaries, flowing through the state, are the Shewand, the Purna-Dudna, the Pranhita, Girja and the Indravati. The Godavari and its tributaries have carved their valleys on the Deccan Lavas. The average height of the basin range between 550 and 350 Metres. The basin narrows down eastwards, it is hardly 350 Kms. in width near Nanded, as against a width of 150 to 200 Kms. higher up. The whole valley looks like a funnel.

(b) BHIMA:-

The Bhima, itself a larger tributary of the Krishna joining the latter outside
the State near Raichur (AP) rises near Bhimashankar in Poona district and has a flow southwards for about 500 Kms. The Mula-Mutha, the Nira and the Man are its main right bank tributaries, while the Ghod and the Sina are its left bank tributaries. While these right bank tributaries, and the Ghod of the left bank ones rise on the eastern slopes of the Ghats, the Man and the Sina have their sources lower down in the driver sections of the plateau. The Bhima valley, 400 to 700 Metres is hardly 250 Metres below the flat tops of the Balaghat ranges. The whole valley is dotted with isolated masses of residual hills and erosional relics of the intratrappeans.

(iii) KRISHNA :-

The Krishna river has its source in the eastern slopes of the Mahabaleshwar plateau, at heights of about 1500 Metres and has a southward flow. The Koyana, the Kudali, the Venna, the Urnodi, the Tarali draining in Satara, the Varna on the Sangli-Kolhapur boundary, the Panchaganga, the Dudhaganga, the Hiranyakesi, and the Ghataprabha in Kolhapur are the main right bank tributaries, while the Vasna and the Yerla draining the southern slopes of the Mahadeo ranges are the right bank tributaries. All the left bank tributaries rise on the eastern slopes of the Sahyadries or its smaller projecting spurs.

(d) PANCHAGANGA :-

The Panchaganga river is formed by four streams draining an area
of 2600 Sq.Kms. These four streams are, from north to south, the Kasari, the Kumbhi, the Tulsi and the Bhogavati. The fifth river Sarasvati is supposed to be running underground.

(e) NARMADA AND TAPI :-

The Narmada and the Tapi seem to owe their long westward flow to their usurping a rift valley. The Narmada, forming the northern boundaries of the state in the Dhulia district flows west in a deep gorge separated from Tapi valley to the south by the Akhrani hills, a part of the Satpudas. The Narmada valley is inaccessible and literally cut off by its flanking scarps.

The Tapi river rises in the northern slopes of the Satpudas in Madhya Pradesh and flows west, forming a boundary in parts between the Amravati district and the Madhya Pradesh. It flows out of the state into M.P., to enter once again near Edalabad in Jalgaon district the state through the Burhanpur gap. Flowing further west in almost a straight line course, the Tapi leaves the state finally to enter Gujarat.

The Tapi has many tributaries, of which the Boray, Panjhara, Bori, Girna and the Purna, all on the left bank are the most important. A number of small streams also drain southwards the southern slopes of the Satpudas, and join the river on the high bank. These rises in the southern scarps of the Gawilgad hills in the Amravati district flows south and then turns west to flow through Akola and Buldhana to meet the Tapi across the narrow
corridor between Ajanta and Satpuda hills east of Jalgaon.

(f) THE WARDHA-WAINGANGA RIVERS :-

Penganga, Wardha, Wainganga, Pench and Kanhan are all tributaries of the Godavari passing through the Nagpur plain. The Kanhan, with its tributary Pench, flows east through Nagpur and joins the Wainganga. The Wainganga enters the Bhandara district on the north-east and flows diagonally across it until it passes within a mile of Bhandara town on the south-west, its valley being compressed between the Ambagad and Gaikhuri ranges.

(g) THE KONKAN RIVERS :-

The Konkan coastal lowlands is dissected by numerous short streams. Rising in the steep western scarp of the ghats at heights of about a thousand metres or more, they fall through steep gradients to empty their currents through swift currents into the Arabian sea. These rivers have esturine mouths; the mouths are often blocked by sandbars and spites growing across them. These rivers overflow during the monsoon season. Their lower reaches are marshy and tidal.

The longest of the Konkan rivers are the Vaitarna and Ulhas that drain the northern sections. Close to their mouths, these rivers have developed logitudinal courses running parallel to the coast; this deviation is mainly due to the dyke ridges than run parrel to the coast. The main central and
south Konkan rivers are the Patalganga, the Amba, the Kundalika, the Savitri, the Vashishti, the Shastri, the Kajvi, the Vaghothan, the Karli and the Terekhol.

Most of the Konkan rivers are short and swift. Some of the rivers become dry during summer season.

(ii) **L A K E S :-**

Not many lakes are found in Maharashtra. The gneissic country of Bhandara, Chandrapur and Gadchiroli have numerous such small lakes and hence this area is known as the ‘Lake country’ of Maharashtra. The best known of these is the Tadoba lake in the western part of Chandrapur district, a spot of tourist attraction. Outside this region the main large lakes are the Ramsagar of Ramtek in the Nagpur district, the Visapur lake in Bhima valley; the Dhamapur lake near Lonavala in the ghats. In the southern slope of the Ajanta hills lies a circular depression filled by Lonar lake. Some of the lakes are useful for agricultural activities.

2.7 **C L A I M A T E :-**

In a large measure climate determines where man may live and thrive, what crops he may raise? What type of home he may appropriately build? Sort of clothing he may wear? and what pests and diseases he must combay⁶ The potential crop producing capability of a given area is dependent mainly on the existing climatic and soil conditions. Since, climatic factors exert mainly a regional influence on plant life, the differences in the behaviour
of a crop or a group of crops over extensive area, as in a given state or a group of states, may be considered as due primarily to differences in climatic rather than soil conditions. It is obvious that climate dictates the range of crops which a country can economically produce. This in turn sets the range of commodities which that country must import if it wishes its people to live a full life in the modern sense. The success or failure of the cropping season is determined by the intensity of the climatic factors. The three most important factors of climate from the standpoint of plant response are temperature, water supply and light and they may be treated as primary determinants of crop growth.

Climate plays an important role in affecting the characteristics of agricultural economy in a region. It can influence the choice of farming system either indirectly through its impact on soil formation or directly through such as the length of the growing season, the occurrence of frost and the availability of water for crop growth.

A factor of outstanding importance in determining the climate of Maharashtra is the north-south trending Sahyadries. The entire state broadly falls under tropical monsoonic climate. The monsoonal rhythm dominates the climatic characteristics of the state. However, its major portion is semi-arid with three district seasons -

(A) Winter season (November to February)
over the northern interior part of the state.

(B) THE HOT WEATHER SEASON :-

During this season of hot weather, local sea winds prevail in the coastal districts and dry winds in the interior. Hence the temperature is highest in the interior and there is a large contrast of temperature between the coastal belt and interior. Although not a rainy season it is a period of thunderstorm activity and thundershowers account for 8 to 13 Cms of rainfall in Kolhapur area. Elsewhere, it is 2 to 5 Cms.

(C) RAINY SEASON :-

This season starts from June and end in September. The period of the southwest monsoon (June to September) accounts for 85% of the annual rainfall in the state, yet it must not be imagined that it rains continuously over the area. Heavy rain occurs in association with strong monsoon conditions. Winds during this period are generally light to moderate in the interior. Westerlies are sometimes strong especially along the coast, and turn to get velocities during the passage of cyclones and when the monsoon becomes very strong. There are a number of important elements of the climatic conditions. They are as follows :-

(i) TEMPERATURE :-

The temperatures regulates all the chemical and physical processes
(B) Rainy season (June to September)

(C) Summer season (March to May)

(A) WINTER SEASON :-

This is the coolest part of the year. Mainly continental tropical air prevails over the region. There is very little rainfall in the eastern part of the state (Marathwada and Vidarbha) which gets 1 to 2 Cms of rain. The mean daily maximum temperature is 28° C in the coastal belt and 30° C to 33° C inland. Although it is winter, high maximum temperatures of the order of 38° C to 39° C have been recorded on individual days. The Konkan daily minimum temperature is highest in south Konkan about 21° C to 22° C. It is 17° to 20° C in north Konkan, 13° to 16° C in Marathwada and Vidarbha. It is lowest in North Deccan 11° to 13° C. On individual days, the minimum temperature have reached even freezing point in the Nasik area.

The lowest temperature -0.6° C has been recorded at Malegaon on the first February, 1960. The daily range of temperature is very high in the interior, being 17° C on the mean. This is a season of low humidity. On the whole, the cool weather season is a period of cool and bracing climate, light and variable winds and fair and sunny weather with clear, blue skies. Early morning dew and mist are common; they disappear soon after the sun rises in the skies. Some times cold waves are felt for one or two days
of plant metabolism. The metabolic processess begin at a certain minimum temperature and increase with rise of temperature until they reach a maximum at a temperature called the optimum. Further, with rise in the temperature above the optimum level the metabolic activity is showed down until it ceases at a temperature called the maximum. Each species has its own minimum and maximum beyond which its life activity ceases. Each crop plant needs a certain number of effective heat units for germination, growth, stalking, maturity and ripening. This is called the thermal constant and varies from crop to crop. The temperature above the minimum is, therefore, effective in furthering the growth of a plant towards maturity and ripening. The crucial air temperature is 16°C at which plant grow. Ideal temperature conditions for crop production are between 18.3°C and 23.9°C.

The coastal districts which have low annual variation, the mean daily temperature is about 22°C throughout the year with relatively high humidity. During the winter season the mean daily maximum temperature is 28°C in the coastal belt and 30°C to 33°C inland. The mean daily maximum temperature is 35°C to 40°C over the Deccan plateau during the hot season. Some times 41°C to 45°C temperature is recorded in certain parts of Vidarbha. The highest temperature recorded on any day has not exceeded 41°C in Konkan during summer season. During rainy season 29°C to 31°C temperature is found in the coastal area, while 27°C to 38°C
temperature is observed in the interior part of the Maharashtra. The summers are very hot in Nasik, Aurangabad, Amravati and Nagpur divisions.

During summer season agricultural crops are mainly found in irrigational tracts of Kolhapur, Pune, Nasik, and some parts of Latur, Aurangabad, Amravati and Nagpur divisions.

(II) RAINFALL :-

Rainfall is the dominant single weather element influencing the intensity and location of farming system and the farmers choice of enterprises. It is also becomes a climatic hazards to farming when it is characterised with scantiness, concentration, intensity, variability and unreliability\textsuperscript{14}. The quantum of rainfall and the number of rainy days may be quite sufficient to meet the annual requirement of successful crop production, provides they are so naturally spread that rain is received at the time is required.

Heavy rains spill over the ghats and coastal districts with annual average of 200 CMS. The major portion of the state, however, lies in the rainshadow of the ghats, with the rainfall average around 60 to 70 CMS and in some areas even less than 50 CMS. Thus the rainfall varies from 50 to 500 CNS in the state with average of about 100 CMS distributed over 60 to 70 days. The south west monsoon is the main rainy season during which different parts of the state get the major portion of about 80% of total land precipitation. It extends from June to October.
Normally, the heavy rainfall occurs immediately following the onset of monsoon with an interlude of dry spell and again it is followed by a second maximum in the month of September. In Pune, heavy rains occur approximately from June 25th to August 8th, whereas in semi-arid zone i.e. in and around Solapur the heaviest rainfall occurs in late September and early October resulting from the retreating south-west monsoon.

Amboli in south Konkan at the foot of the ghats receives about 720 CMS. Konkan has an average of 267 CMS. East of the ghats, rainfall decreases rapidly, some of the places in the immediate lie of the ghats in western Deccan recording during rainy period 35 CMS to 50 CMS only. Poona has an average of 66 CMS and Satna in Dhulia 48 CMS, Ahmednagar and Solapur districts are in the drier zone. It increases in Marathwada to 60 CMS and in eastern Vidarbha to 100 CMS. While over most of Deccan the number of rainy days of 25 to 35, it increases to 50 in east Vidarbha.

The winter rains are of little significance and account for at the most 5 to 6% of the rainfall received by eastern districts of the Western Maharashtra. The monsoon current becomes weaker and weaker in the western direction over the Deccan plateau. In Vidarbha region, the rains are largely confined to a six week period which include about 10 days in June and the whole of July.

In fact, July is the rainiest month in the whole of Maharashtra. The September rains are dependable. The eastern part of Vidarbha gets heavier
MAHARASHTRA STATE
Map No. 2.6
Mean Annual Rainfall in mm 1970 to 1995

INDEX
Above 1600 mm
1300 to 1600 mm
1000 to 1300 mm
700 to 1000 mm
Below 700 mm

Map No. 2.7
Co-efficient of Rainfall Variability 1970 to 1995

INDEX
Above 35%
30% to 35%
25% to 30%
Below 25%
rains and is more prolonged than in the western part and also it is more or less evenly distributed during the entire monsoon season. A few showers from retreating north-east monsoon associated with cyclonic storms are also received in these parts during winter season in the month of January and February.

The Purna-Wainganga valleys, which includes Bhandara, Chandrapur, Nagand Gadchiroli districts are reached by the climatic influence of the Bay of Bengal and receive over 100 CMS of rains.

The south-west monsoon as the pivot around which almost the entire farm life and economy swings. Rainfall has control and for this reason is a seasonal rhythm of conditions influencing the patterns of landuse.\(^5\)

The record of the rainfall in the Maharashtra State is available for the period ranging from 1970-1995. The details of the mean annual rainfall and co-efficient of rainfall variability from 1970 to 1995 are given in the Table 2.1.

The mean annual rainfall in the state varies from 533 MM in Ahmednagar to 3,259 MM in Sindhudurg district. Generally, rainfall decreases to the central part of the state (Map 2.7). Again it increases to the eastern part of Maharashtra.

The western coastal part comprising Mumbai, Thane, Raigad, Ratnagiri, Sindhudurg districts have comparatively 75 to 95 rainy days and central
Table 2.1 Mean annual rainfall and co-efficient of rainfall variability in Maharashtra State 1970 to 1995.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name of the district</th>
<th>Mean annual rainfall in m.m.</th>
<th>Co efficient of rainfall variability in %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Mumbai</td>
<td>2035</td>
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<td>25.93</td>
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<td>Chandrapur</td>
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<td>29.96</td>
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<tr>
<td>30.</td>
<td>Gadchiroli</td>
<td>1437</td>
<td>28.19</td>
</tr>
</tbody>
</table>

**SOURCE**: Computed by the Author.
part comprising Marathwada and western part of Vidharbha have 35 to 42 rainy days. The eastern part comprising Nagpur, Bhandara, Chandrapur and Gadchiroli have 60 to 70 rainy days.

The co-efficient of rainfall variability is calculated by the following formula.

\[
S = \frac{\text{Co-efficient of rainfall variability}}{X} \times 100
\]

Where \( S \) = The standard deviation

\[ X = \text{The Arithematic mean of rainfall during the 25 years.} \]

In general the variability is high where the rainfall is less. It will be seen from Table 2.1 that the variability of rainfall in the state ranges between 18.74%, 40.45% in Sindhudurg and Nasik respectively. In Konkan agricultural region variability ranges from 18.74 to 29.75%. Districts like Buldhana, Akola, Amravati, Yavatmal, Wardha, Nagpur, Bhandara, Chandrapur and Gadchiroli have 20 to 29% rainfall variability. The moderate variability was found in Parbhani, Latur, Kolhapur, Sangli, Satara and Jalgaon districts. The high variability (above 30%) was observed in Dhule, Pune, Solapur, Aurangabad, Jalna, Bhir, Nanded, and Osmanabad districts.
(III) SPECIAL WEATHER PHENOMENA :-

In association with cyclonic storms in the Arabian sea during the post-
monsoon months and to a lesser extent in May, the coastal division
experiences very strong winds, sometimes reaching gale force, particularly
very near the coast and heavy windspread rain. Occasionally, these storms
may occur across the coast in the northern part of the coastal region and
cause heavy and widespread damage. The highest speed on record is
129 Kms per hour at Colaba and 151 Kms per hour at Juhu in November,
1948. Thunderstorms occur in April and May and just before the onset
of the monsoon as also in late September to the middle of November. Severe
thundersqualls with speeds reaching 120 Kms per hour in gusts have been
recorded at Poona and Nagpur. The ghats are fully clouded or overcast
on most days during the south-west monsoon period\(^{17}\).

(IV) CLIMATIC REGIONS OF MAHARASHTRA :-

According to Green Treewartha’s Scheme of climatic classification, the
Konkan coast fall under ‘AM’ (Tropical heavy rainfall region) and the semiarid
‘leeside’ districts of Ahmednagar, Dhule, Nasik, Solapur, Sangli, Pune,
Western part of Bhir, Aurangabad, Osmanabad under the ‘BS’ (Tropical
semiarid climatic region). Vidharba and Marathwada can be grouped under
‘AW’ type (Tropical wet and dry climatic region of monsoon savana climatic
region).
As per National Agriculture Research Project State of Maharashtra is divided into nine agro-climatic zones\textsuperscript{18}.

i) Very high rainfall zone with lateritic soils

ii) Very high rainfall with non-lateritic soils

iii) Ghat zone

iv) Transition I

v) Transition zone II

vi) Scarcity zone

vii) Assured rainfall zone

viii) Moderate to moderately high rainfall zone

ix) High rainfall zone with soils formed rocks of mixed origin.

(i) **VERY HIGH RAINFALL ZONE WITH LATERITIC SOILS** :-

This zone covers the districts of Sindhudurg, Ratnagiri, and some parts of the Kolhapur districts. This zone gets 200 to 250 Cm. of rainfall. Lateritic soil is found in this zone.
(ii) VERY HIGH RAINFALL WITH NON-LATERIC SOILS :-

Lateritic soils are not found in this region. This covers the districts of Raigad, Thane, Mumbai and some parts of Nasik district. This gets 200 to 300 Cms. rainfall. Relative humidity is 80 to 90% during rainy season.

(iii) GHAT ZONE :-

This zone covers Gaganbawada, Radhanagari talukas of Kolhapur district and some part of Satara district. This zone receives 400 to 700 CMS of rainfall.

(iv) TRANSITION ZONE-I :-

This covers some part of Kolhapur, Satara and Dhule districts. It receives 150 to 300 Cms. rainfall.

(v) TRANSITION ZONE-II :-

It covers some parts of Satara, Kolhapur and Pune districts.

(vi) SCARCITY ZONE :-

This receives 50 to 65 Cms. of rainfall. It covers districts of Marathwada, Nagpur and Solapur.
(vii) ASSURED RAINFALL ZONE :-

It covers Akkalkot taluka of Solapur, Soyagaon, Aurangabad, Khultabad taluka's of Aurangabad, Mukhed, Degur taluka's of Nanded etc.

(viii) MODERATE TO MODERATELY HIGH RAINFALL ZONE :-

It covers some parts of Nanded, Amravati, Nagpur, etc.

(ix) HIGH RAINFALL ZONE :-

This zone covers some parts of Chandrapur and Gadchiroli districts. This zone receives 150 to 200 Cms. of rainfall.

2.8 SO I L S :-

Soils constitute the physical basis of an agricultural enterprise and play a very important role in the agricultural economy of the region. Differences in soil texture, drainage and fertility are of major importance in explaining contrasts in agriculture. Unlike climate, soils should not be regarded as part of the natural endowment of an area. In fact, it is agriculture that modifies soils, excepting certain virgin soils which can retain their original characteristics. On the whole, soils constitute the physical base for any agricultural enterprise. Farming is a business and good soil is part of the farmers stock in trades good soils are good to the extent that man makes judicious use of them. Our standard of living which predominantly depends on agriculture is often determined by a combination of the physical,
chemical and biological characteristics of the soils and crops and livestock raised on them\textsuperscript{20}.

Soils provides essential material on which agriculture is based and therefore, any comprehensive survey of the geography of agriculture should include a fairly thorough treatment of soils. Even at the beginning of his work on political geography, Ratzel made a statement of great significance and insight “Jeder Staat ist ein Stück Menschheit” (Every nation is a bit of soil and humanity)\textsuperscript{21} (Quoted by Klages 1958). Crop growth is determined to a considerable extent by the amount of nutrients in soils. The three nutrients, namely, Nitrogen, Phosphorus and Potassium contribute to soil fertility.

Important soil groups recognised in the state have been presented in Map 2.8. The major soil groups are given below:

(I) **BLACK SOILS.**

(a) Shallow black soils

(b) Medium black soils

(c) Deep black soils.

(ii) Laterite and lateritic soils

(iii) Coastal alluvial soils
(iv) Saline - alkali soils

(v) Mixed red and black soils, red loam, red and yellow soils

(vi) Coarse soils on hill slopes and clay loam in valleys

(vii) Coastal saline soils.

(i) BLACK SOILS :-

The basic Lava, with its content of Ferro-magnesian group of minerals has given rise, on tropical weathering, to soils that have become known as regur or more significantly as the black cotton soil, from the colour of the soil and the crop grown successfully in such soils. Though regur is derived from a variety of rocks, it is found to be developed deepest and best in the basic lava. The black colour of the soil was formerly attributed to the high humans content, but later works suggest the high percentage of iron content as the cause. The soil is very rich in calcium and Magnesium carbonates but poor in nitrogen, potash, phosphates and humans.

These soils occur extensively in the state. They are found in semi-arid, dry sub-humid and moist sub-humid regions at elevations of 300 to 900 Metres above means sea level with hot summer and mild winter. Agriculturally, the regur or black soils are very productive. They usually respond to application of nitrogen and phosphorous fertilizers and to the addition of farmyard manure and green manure. Owing to its clayey character,
it becomes unworkable during heavy rains and is better suited for rabi crops like wheat, gram and linseed than for kharif crops.

The sub-soils are responsible for restricted drainage and pose problems to their management for high productivity. The soils show a great variability in their depth as well as characteristics and therefore, are generally grouped as shallow, medium and deep black soils.

(A) **SHALLOW BLACK SOILS:**

(Upto 22.5 cm depth). These soils are mixed with disintegrated Murum (coarse partly disintegrated parent material) and form about 22 per cent of the black soils. These soils are found in Amravati, Wardha, Yeothmal, Nanded, Pune, Satara, Kolhapur and Sangli districts. These soils are generally coarse textured and are characterised by low fertility. They are shallow with low moisture retention capacity. These are found on piedmont and eroded surfaces and are classified as usthenths.

(B) **MEDIUM BLACK SOILS:**

(22.5 to 90 CM depth). Medium black soils occupy the largest area of the state (about 65 per cent). These are mostly found on piedmont plain. Particularly they are found in the districts of Thane, Aurangabad, Parbhani, Nanded, Nagpur, Solapur, Chandrapur, Bhir, Jalna, etc. These soils are medium to heavy in texture, fairly high in clay content with base saturated with Ca²⁺ as the predominant exchangeable cation. They have
high lime reserve (upto 15 per cent) and neutral to alkaline reaction (PH 7 to 9). These, having ABC horizons with aberrant characteristics of vertisols are classified as vertic subgroups of Inceptisols.

(C) DEEP BLACK SOILS :

(Above 90 CM depth). Deep black soils occupy about 16.35% cultivable area of the Maharashtra State. These soils are found in vast stretches in river valleys of Godavari, Tapi, Manjara, Krishna, Nira, Panchaganga, and Purna and also in the piedmont plains. These soils are more fertile than medium black soils. The structure is granular in surface layer and becomes massive or cloudy with angular shining wedge shaped surface at lower depth. The clay content ranges from 40 to 60 per cent but may be as high as 70 per cent. These soils are classified as vertisols.

(II) LATERITE AND LATERITIC SOILS :-

Heavy leaching during the downpouring monsoonal rains in the coastal residual plateau of south Konkan, the crest and the high plateaus of Sahyadris, and the upper Krishna valley, has produced wide spread occurrence of high and low level laterites and lateritic soils in them. Out of the total cultivable land of the state laterite and lateritic soils covers about 4.49% area. Vast laterite soil cover is found in the low-lying plateau and residual hills of Sindhudurg, Ratnagiri and Kolhapur; the Sahyadrian peaks themselves are covered by high level lateritic caps. The exact way of
formation of laterite undertropical humid conditions is still a matter of controversy. In these soil, virtually all silica has been leached out with a consequent concentration of iron and aluminium oxides. These soils, are rich in iron, aluminium and manganese oxides and are poor in lime and organic material.

Laterite soils, with a brick-red colour and a profile of 1 to 3 feet are duisintegrated loams charged with iron nodules. Though the laterite cap itself may be quite thick, the soils are usually thin. Being denuded of all the bases by leaching laterites have an acidic reaction. It is this characteristic that makes laterites lack in fertility and be of little value for crop production. They are more suitable for plantation crops like rubber, tea and coffee.

(III) COASTAL ALLUVIAL SOILS :-

These soils are found in Sindhudurg, Ratnagiri and Raigad districts. These soils are derived from trap and are fairly deep, clay loam in texture, greyish black in colour and alkaline in reaction (PH 7.5 to 8). They are predominantly rich in illite clay material. The lime content ranges from 1 to 5 per cent. The soils moderately deep coarse loamy to fine loamy are Ustropets and Tropawuepts.

(IV) SALINE-ALKALI SOILS :-

These soils are found in the western part of Sindhudurg, Ratnagiri and Raigad districts. These soils are clay loam to clay in texture and greyish
black in colour. Soils contain 0.5 to 5 per cent lime and PH is upto 9.5. The electrical conductivity of Saturation extract of saline soils is more than 4 MMhos/CM at 25°C. ESP is less than 15 and PH is less than 8.5. In case of sodic soil the electrical conductivity of saturation extract is less than 4 MMhos/CM, ESP more than 15 and PH of saturation extract more than 8.5. These soils are spread over the state in isolated patches.

(V) MIXED RED & BLACK SOILS, RED LOAM,

RED & YELLOW SOILS;

These soils are found in North Chandrapur, North Gadchiroli, Nagpur and Bhandara districts. The tract of dissected rolling land and residual hills consists of red gravelly, shallow to moderately deep with low available moisture capacity. Nearly 70 per cent of the area in Bhandara district is under these soils. Their physico-chemical properties are more or less similar to medium deep black soils. In addition, very shallow and coarse textured gravelly red soils occur in this area. Such soils contains very high percentage of free lime, stones and gravel. The colour of these soils is generally red or yellowish red due to presence of iron oxides.

(VI) COARSE SOILS ON HILL SLOPES AND

CLAY LOAM IN VALLEYS:

These soils are also derived from trap and occupy the mountainous
terrain in the west. According to their topographical situation, they vary in depth from a few centimetre on steep slopes to more than one metre in valleys. The soils are low in base status and neutral to slightly acidic in reaction as rainfall in this tract is comparatively high. The soils in the valleys which receive washings from hill slopes are comparatively more fertile, constitute what are known as rice fields.

(VII) COASTAL SALINE SOILS :-

These soils occur in western part of Sindhudurg, Ratnagiri, Thane and Raigad disttricts. These soils are derived from trap and are impregnated with salts to varying extent according to their location with respect to sea. In the immediate vicinity of the coast or creeks, they are highly saline and are not capable of supporting any crop except the so called bush type of vegetation.

SOIL EROSION AND CONSERVATION MEASURES

Indiscriminate destruction of forests and uncontrolled grazing in the gentler hill slopes and foot-hills, has resulted in concentrated hill and gulley erosion in many parts of the Sahyadries and the Deccan plateau, particularly in Western Sections. Only steeper and higher slopes of more difficult access, have good and protective forest cover. In a similar fashion, the large scale destruction of teak and other valuable forests in the low hills and laterite plateaus of Konkan has deprived the soils of the finer soil nutrients by heavy
Table 2.2: Soil conservation Programme-Yearwise Achievement 1970-71 to 1993-94.

<table>
<thead>
<tr>
<th>Year No.</th>
<th>Achievemnt in completed Bunding units in lakh hect.</th>
<th>Year</th>
<th>Achievemnt in completed Bunding units in lakh hect.</th>
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</thead>
<tbody>
<tr>
<td>1970-71</td>
<td>6.35</td>
<td>1982-83</td>
<td>6.78</td>
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<td>9.01</td>
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<td>1981-82</td>
<td>5.67</td>
<td>1993-94</td>
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**SOURCE:** Epitome of Agriculture 1993-94 and 1994-95, Part-I
Commissionerate of Agriculture M.S. Pune P. 156.
leaching and have rendered the laterite caps useless even for poor grazing. Thus, deforestation has accelerated the pace of gully erosion and resulted in the development of unassorted, coarse grained debris slopes at foothills, often spreading into the good cultivable level lands of the valley-floor and rendering them unsuitable for cultivation. Deep destruction in the source regions of head streams of most of the Deccan rivers in the scarps of the uplands has resulted in serious problems of soil erosion in these areas. Bank erosion, and gully action in piedmont slopes, to the north of the Tapi and Purna valleys has created similar problems in what have been reduced to badland topography full of ravines.

Field bunding, contour ploughing, arrest of debris encroachment, regeneration of forests in lower slopes, improvement in land and farm management are the remedial measures of conservation of soils that are likely to yield results if planned carefully with reference to regional and local needs.

The Government of Maharashtra has taken several measures like, field channels, field drains, graded bunds, masonry work, outlets, land levelling and grading for the conservation of soils in the State Soil Conservation Programme was started in 1965-66 in Maharashtra. Table 2.2 indicates that Maharashtra Government has completed funding of 181.61 lakh hectares from 1970-71 to 1993-94 in the various parts of the state. But this work is not sufficient to the entire state.
Under non-CADA Project additional 4.25 lakh hectares of land was developed from 1975-76 to 1992-93. Maharashtra Government has done this progress through Five Year Plans.

2.9 NATURAL VEGETATION :-

Vegetation of some sort of the other is the natural covering of the land surface of the earth. Even the so called deserts have their vegetation, though it may be scanty and inconspicuous. Natural vegetation is important from the view point of rainfall distribution and the fertility of the soil. It also check the soil erosion to the greater extent. It also keeps the environmental balance. It is also important to protect the wild animals. Forests also provides wood which is essential for the construction of houses and making farm imprements.

The natural vegetation of a region depends upon the distribution of climatic elements over the region, edaphic or soil conditions, topography or terrain, natural drainage conditions, biotic factors and the extent of human interference. Of the climatic elements, no doubt, temperature and rainfall and their seasonal and total distribution are by far the most important. Over Maharashtra, as over most of India, temperature and sun-shine, being large over all the months of the year, are not so very restrictive or critical of natural vegetation growth as the availability of adequate soil-moisture for the plant life.
The vegetation of Maharashtra can be grouped as follows :-

(i) TROPICAL EVERGREEN FORESTS :-

The dense tropical evergreen forests, characteristic of the wet zone (with rainfall more than 200 Cms.) are found south of the latitude of Mumbai. They occupy large tracts at the foot of the Ghats and also on the gorges, slopes and summits of the loftier Ghats. Mahabaleshwar and Bavnoli ranges are clothed with evergreen forests which, further east, yield place to semi-evergreen and mixed deciduous forests as the climate becomes drier. In the protected depressions and valleys of the Ghats, thickest evergreen forest of the zone is luxuriantly developed. The variety and richness of this evergreen forest increases to the south. The important species found in this forest are strobilanthes, mango, ferns, palons, bamboo.

(ii) TROPICAL SEMI-EVERGREEN FORESTS :-

As the rainfall decreases to less than 200 Cms., in the marginal areas, with rainfall of 160 to 200 Cms; a semi-evergreen type of vegetation thrives. It is essentially marginal to the evergreen and moist deciduous types, and occurs in local patches along the flanks of such forests. On the more windy sections and the crests of the Ghats, the semi-evergreen type with smaller and stunted trees than those of the evergreen type are found. Kindal is typical of these forests. The upper canopy of these forests consists of deciduous species while the middle and lower ones are evergreen. Bamboos
and liance occur in riverine patches.

(iii) TROPICAL MONSOON FOREST:

With a rainfall of 120 to 160 Cms. concentrated in the four months of the monsoon period, the moisture available is not adequate enough for evergreen species and hence deciduous species, shedding their leaves in the hot summer to check transpiration, become characteristic. Such forests are found in the Chiroli and Nauegaon hills in eastern Chandrapur and Gadchirol, the Gawilgad hills, North Konkan hills, the leeside slopes of the Ghats, and the western sections of the Madeo, Harichandra Ghat and Satmala ranges. Viewed from an economic point of view, these are the most valuable forests. The forest trees grow to heights of 30 to 40 metres, and develop into fairly dense jungles with open glades in between. In these areas shifting type of cultivation is carried on large scale. The dominant climax vegetation is essentially deciduous in character, though the lower canopy and undergrowth tend to be evergreen. Bamboos dominate the undergrowth. The major species of these forest are teak, ain, hirda, shishum, dhavda, kusum, siris, billa and others.

(iv) SUB-TROPICAL EVERGREEN FORESTS:

These forest are found in the more rainy upper section of the Ghats (above 1,000 Metres) and the high level plateau like Mahabaleshwar-Panchgani and parts of the Gawilgad hills on account of the heavy rains
that they receive and the comparatively milder temperatures, an effect of latitude. These forest have been mostly destroyed and occur only in patches. Magnolia, chestnut, jambul and ironwood tree are common.

(v) **DRY DECIDUOUS FORESTS** :-

Dry deciduous forests tend to predominate, with a rainfall of 80 to 120 Cms. They are found mainly in the Satpudas of Dhulia district; and the lower foot-hills of the Ghats on the Deccan side, as the forests grade into scurb jungles. Dry teak, ain, dharda, anjan are common in these forests, that have more stunted trees. The forests appear green only during the rains. In other seasons, they have a barren, desolate appearance, with leafless trees. Grass cover is more widespread in these forests.

(vi) **SCRUB JUNGLES OR THORNY FORESTS** :-

Thorny forests are found with a precarious rainfall of less than 80 Cms. The distinction in the dry season is so marked, that the long grass, stunted trees and almost all bushes, except in the edaphically damper areas, are deciduous. The whole Deccan plateau east of the Ghats covered by these jungles present a uniform straw-coloured surface, with spots of green along water courses to break the Monotony. During the rains however the whole land-scape almost overnight turns beautifully green. Khair, babul, salai, Euphorbia and Zizyphus families are the common species of these jungles.

Table 2.3 indicates that about 53.93 lakh hectares or 17.54% of the
TABLE NO. 2.3 Districtwise change in forest area in Maharashtra State
Area in '00' hectares

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name of the District</th>
<th>1970-75</th>
<th>1990-95</th>
<th>Volume of Change in % 1970-75 to 1990-95</th>
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<tr>
<td></td>
<td>Area under forest</td>
<td>% to the total geographical Area</td>
<td>Area under forest</td>
<td>% to the total geographical Area</td>
</tr>
<tr>
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<td>Mumbai</td>
<td>15</td>
<td>3.95</td>
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SOURCE: Computed by the author
total geographical area of the study region was under forest during 1970-75. It decreased from 53.93 lakh hectares to 53.55 lakh hectares between 1970-75 to 1990-95.

This shows that there is minor decrease in forest area. There are 31 districts in Maharashtra but only 30 districts are considered for the study. Greater Mumbai is excluded from the study. Out of the thirty district Thane, Raigad, Nasik, Amravati, Bhandara and Chandrapur were having 21 to 40% of their total geographical area under forest during 1970-75. About 74.48% area was under forest in Gadchiroli district during the same period. About 10 to 20% geographical area was under forest in Jalgaon, Ahmednagar, Pune, Satara, Kolhapur, Buldhana, Yavatmal, Wardha and Nagpur districts during 1970-75. In rest of the districts the share of forest area was below 10%. There was very little area under the forest in Latur, Osmanabad, Ratnagiri and Solapur district during 1970-75.

In 1990-95, 53.55 hectares that is 17.41% of the total geographical area was under forest in Maharashtra State. This shows slight decrease of 0.13% during the period of investigation. Table 2.3 indicates Raigad, Nasik, Thane, Dhule, Kolhapur, Amravati, Yavatmal, Nagpur, Bhandara and Chandrapur were having 17 to 36% of their geographical area under forest during 1990-95. Gadchiroli was first in area under forest (74.44%) in the State of Maharashtra during 1990-95. About 9 to 15% geographical area was under forest in Jalgaon, Pune, Ahmednagar, Buldhana and Wardha.
district during 1990-95. During 1990-95 about 4 to 9% geographical area was under forest in Mumbai, Sindhudurg, Akola, Sangli, Aurangabad and Nanded district during 1990-95. On the other hand, other remaining district were having very little area under forest during 1990-95.

Area under forest shows a slight positive and negative change in different districts of the study region. Positive change was occurred in Solapur, Sangli, Bhir, Latur, Yavatmal, Nanded, Bhandara and Chandrapur districts. Elsewhere the slight negative change was took place.

With a view to maintaining ecological balance through plantation of trees on community lands and encouraging tree plantation on private lands several plantation programmes have been undertaken in the state. In addition to the plantation by the Forest Department during 1994-95, plantation on community land was carried out over an area of 15 thousand hectares by the Social Forestry Department. The area covered by tree plantation on private land in 1994-95 was 6 thousand hectares. During 1995-96 upto November 1995 plantation on an area of 16 thousand hectares was carried out on community land.

With a view to maintaining ecological balance, the Government has restricted the clear felling of trees in the forest areas. As a result the felling of tree is done on limited scale. The estimated production of timber in 1995-96 was about 1.08 lakh cubic metres valued at Rs. 63/- crore as compared with the production of 1.15 lakh cubic metres in 1994-95 valued at Rs.
45/- crore. The estimated production of firewood in 1995-96 was 1.53 lakh cubic metres valued at Rs. 5.50 crore as compared with 2.77 lakh cubic metres produced in 1994-95 valued at Rs. 4.19 crore. The value of minor forest produce in 1995-96 was estimated at Rs. 57/- crore as compared with Rs. 67/- crore in 1994-95. Tendu leaves accounted for Rs. 41/- crore and bamboo for Rs. 14/- crore in the value of the minor forest produce in 1995-96.

2.10 SUMMARY:

We have seen location, historical background, physiography, drainage, climatic conditions, soils, and natural vegetation of the state which are important factors for the development of agriculture.

(i) The framework of the physical setting is simple, a vast plateau sloping eastward and bounded by hills and mountains to the west and to the north and a narrow coastal lowland to west. Sahyadri mountain region, northern Satpura range, Ajanta range, Balaghat range and Mahadeo range these regions are not useful for the agricultural activities. They have rugged topography and steep slope. The plateau region and river valleys are useful for the agricultural activities. Agricultural activities are highly concentrated in the river valleys of Krishna, Panchaganga, Koyana, Mula, Muta, Tapi, Purna, Godavari, Wainganga and Painganga
river basins.

(ii) Krishna, Panchaganga, Koyana, Tapi, Purna, Warna, Bhima, Manjara, Godavari, Nira, Wainganga and Painganga are the important rivers of Maharashtra. These rivers provide water to the agriculture. Several dam's are constructed over the different rivers. Koyana, Bhima, Jayakwadi, Ghod, Vir, Tulshi, Darna, Mula, Bhandardara, Manjara, Khadakwasala, Kukadi, Warna, etc. dam's provides water to the agriculture of Maharashtra. Various lift irrigational schemes are also practiced in the districts of Sangli, Satara, Kolhapur, Pune, Ahmednagar, Solapur, Aurangabad and Bhir districts. The various rivers have changed the cropping pattern and cultural aspects of the state.

(iii) The rivers of Maharashtra fall under three groups (i) The Deccan rivers and their tributaries that drain down the plateau slope eastwards;

(ii) The Tapi-Purna system that drains west against the plateau slope and

(iii) The short but swift Konkan rivers that drains into the Arabian sea. The western Ghats and to a lesser extent, the Satpudas Maikal ranges constitute the primary water sheds, while the transverse ranges like the Ajanta-Satmalas, the Balaghat and Mahadeo ranges form the secondary watersheds from which many of the tributaries of the Deccan
rivers rise.

Godavari, Bhima, Krishna, Koyana, Warna, Panchganga, Nira, Tapi, Wardha, Wainganga and Panganga rivers are having water during the summer season, hence, these rivers provides water to the agriculture. Most of the rivers of Latur, Aurangabad, Pune, Amravati and Nagpur agricultural divisions became dry during the summer season, hence, they are not useful for agricultural activities in summer season.

(iv) Heavy rains spill over ghats and coastal districts with annual average of 200 Cms. Major portion of the state, however lies in the rainshadow of the ghats with the average around 60 to 70 Cms. and in some areas even less than 45 Cms. In fact July is the rainiest month in the whole of Maharashtra. The south-west monsoon is the pivot around which almost the entire farm life and economy swings. Rainfall has control and for this reason there is a seasonal rythm of conditions influencing the patterns of landuse.

(v) The western coastal part comprising Mumbai, Thane, Raigad, Ratnagiri, and Sindhudurg districts have comparatively 75 to 95 rainy days and comprising Marathwada and western part of Vidharbha have 35 to 42 rainy days. The eastern part comprising Nagpur, Bhandara,
Chandrapur and Gadchiroli districts have 60 to 70 rainy days. Table 2.1 reveals that the variability of rainfall in the state ranges between 18.74%, 40.45% in Sindhudurg and Nasik districts respectively. In Konkan agricultural region variability ranges from 18.74 to 29.75%. Districts like Buldhana, Akola, Amravati, Yavatmal, Wardha, Nagpur, Bhandara, Chandrapur and Gadchiroli have 20 to 29% rainfall variability. The moderate variability was found in Parbhani, Latur, Kolhapur, Sangli, Satara and Jalgaon districts. The high variability (above 30%) was observed in Dhule, Pune, Solapur, Aurangabad, Jalna, Bhir, Nanded and Osmanabad districts during the period of investigation.

(vi) Scarcity zone comprises of 87 tahsils of 14 districts out of 31 districts of the state. This zone covers entire Ahmednagar, and Solapur districts and eastern portion of Sangli, Satara, Pune districts and part of Shirol, and Hatkangale tahsils of Kolhapur district. Similarly, considerable eastern area of Dhule, Jalgaon, and Nasik districts are also covered. These areas are the most vulnerable to aberrant weather conditions. The occurrence of draught is noted once in three years. The scarcity zone of Maharashtra is characterised by inadequate, ill-distributed and undependable rainfall. The year to year rainfall fluctuations are
observed. The annual rainfall is less than 75 Cms. in about 42 days. About 70 to 80% of annual rainfall is received during the south west monsoon period.

(vii) Black soils, laterite, coastal alluvial, saline and Alkaline, mixed red, coarse and coastal saline soil, these soils are found in the different parts of the Maharashtra state. Agriculturally the regur (black) alluvial soils are very productive, hence agricultural activities are concentrated in the river valleys of Maharashtra State. Laterite soils are less fertile, hence they have little value for agricultural crops. The coastal saline soils are highly saline and are not capable of supporting any crop except the so called bush type of vegetation.

(viii) Indiscriminate destruction of forests and uncontrolled grazing in the gentler hill slopes and foot hills, has resulted in concentrated hill and gully erosion in many parts of the Sahyadris and the Deccan plateau particularly in the western sections. Deep destruction in the source of head streams of most of the Deccan rivers in the scarps of the uplands has resulted in serious problems of soil erosion in these areas. Due to the heavy soil erosion agricultural productivity is decreased in some parts of the state.
(ix) Table 2.3 indicates that about 53.93 lakh hectares or 17.54% of the total geographical area of the study region was under forest during 1970-75. It decreased from 53.93 lakh hectares to 53.55 lakh hectares between 1970-75 to 1990-95.

Despite high rainfall and suitable edaphic conditions, many parts of the state do not support forest due to unfavourable soil conditions, rugged terrain, etc. However, the far eastern part of the state supports good forest cover due to good supply of moisture and it accounts for more than 60% of the total area of the state.

Table 2.3 gives us idea about districtwise change in forest area in Maharashtra State. Area under forest shows a slight positive and negative change in different districts of the study region. Positive change was observed in Solapur, Sangli, Bhir, Latur, Yavatmal, Nanded, Chandrapur and Bhandara districts during the period of investigation. Elsewhere the slight negative change was took place. The area under forest was increased due to social forest department of the state. This department has planted various species of the tree's in the different parts of the state. Area under forest is decreased due to heavy cutting of the trees.

***
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1. Prof. B. Arunachalam (1967): “Maharashtra”, Published by Mahendrakumar A Sheth, Princess Street, Bombay-2, p. 5.


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