NATIONAL COMMISSION ON AGRICULTURE
1976

RAINFALL AND CROPPING PATTERNS

Volume IX

MADHYA PRADESH

GOVERNMENT OF INDIA
MINISTRY OF AGRICULTURE AND IRRIGATION
NEW DELHI

NATIONAL COMMISSION ON AGRICULTURE
1976

RAINFALL AND CROPPING PATTERNS

Volume IX

MADHYA PRADESH

GOVERNMENT OF INDÍA
MINISTRY OF AGRICULTURE AND IRREGATION
NEW DELHI

RAINFALL AND CROPPING PATTERNS—STATE SERIES

VOLUME NO.	*STATE*
I	ANDHRA PRADESH
II	ASSAM
III	BIHAR
IV	GUJARAT
V	HARYANA
VI	HIMACHAL PRADESH
VII	JAMMU AND KASHMIR
VIII	KERALA
IX	MADHYA PRADESH
X	MAHARASHTRA
XI	ORISSA
XII	PUNJAB
XIII	RAJASTHAN
XIV	TAMIL NADU
XV	UTTAR PRADESH
XVI	WEST BENGAL

CONTENTS

SECTION		PAGE
1	INTRODUCTION	1
2	METHODOLOGY	1
	Rainfall Patterns	1
	Boundaries of Rainfall Zones	2
	Cropping Patterns	3
	Relative Yield Index of Crops	3
	Livestock Patterns	3
	Soils	4
	Other Data	4
	Presentation of Information	4
3	GENERAL FEATURES	4
	Elevation	4
	Population	5
	Land Use	6
	Soils	7
	Irrigation	7
	Rainfall	8
	Rainfall Variability	8
	Temperature	9
	Potential Evapotranspiration (PE)	9
	Climatic Classification	9
4	RAINFALL ZONES, THEIR CROPPING AND LIVESTOCK PATTERNS	11
	Rainfall Zone I	11
	Rainfall Zone II	12
	Rainfall Zone III	12
	Rainfall Zone IV	14
	Rainfall Zone V	15
	Rainfall Zone VI	16
	Rainfall Zone VII	16
	Rainfall Zone VIII	17
	Rainfall Zone IX	17
	Rainfall Zone X	19
	Rainfall Zone XI	19
	Rainfall Zone XII	20
	Rainfall Zone XIII	21
5	FUTURE CROPPING PATTERNS—SOME OBSERVATIONS	22
	General	22
	Some Observations Pertaining to Madhya Pradesh	22

सत्यमेव जयते

APPENDIX		PAGE
1	Talukwise Land Use (1969-70) and Population Statistics—Madhya Pradesh	24
2	Districtwise Livestock Population—1966—Madhya Pradesh	32
3	Rainfall and Cropping Patterns—Madhya Pradesh	34
4	Area under Principal Crops—Madhya Pradesh	41
5	Map—Rainfall Patterns—Madhya Pradesh	53
6	Map—Cropping Patterns—Madhya Pradesh	55
7	Map—Livestock Patterns—Madhya Pradesh	57

RAINFALL AND CROPPING PATTERNS

MADHYA PRADESH

INTRODUCTION

1.1 The human population of the country is estimated to rise from the 1971 Census figure of 548 million to 935 million in 2000 AD. This rise calls for increased production. Land resources being limited emphasis has to be placed on increasing productivity per unit area. Temperature and other climatic conditions being favourable for crop production throughout the year over most parts of the country, it is possible to grow more than one crop in a year provided water, the most important input, is available. In some parts of the country, the rainy season is long enough to provide scope for double cropping. This potential is yet to be fully exploited. There is scope for increasing irrigation resources in the country, but our estimates show that the area under irrigation is not expected to be more than 42 per cent of the total cropped area even in 2000 AD as against 22 per cent in 1970-71. Therefore, judicious utilisation of direct rainfall and irrigation water, singly and in combination, will have to be thought of for increasing production.

1.2 Farming technology has so advanced that it is possible to increase crop yields even under rainfed conditions, but the choice of crops would have to depend upon the amount and distribution of the prevailing rainfall. Additionally, it will be necessary that the maximum possible quantity of rain water is conserved in ponds and pools situated either within the farm area or elsewhere, in soil profiles and underground storages so that the same could be readily used to save crops in times of water stress. Not only in rainfed farming but even under irrigated conditions, one will have to plan for the most economic and efficient use of water so as to derive maximum possible benefit from rainfall and reduce dependence on irrigation. This necessitates a close study of the existing cropping patterns vis-a-vis rainfall patterns aimed at determining the nature of changes needed in the former. The cropping patterns depend primarily on the soil and climatic factors but the evolution of a cropping pattern in course of time is the combined effect of soil, climate, food habits and requirements and economic factors. In the context of increasing production, it is necessary to examine the cropping patterns from a scientific angle and find out possible alternative patterns having higher potential. Accordingly, the Commission undertook a comprehensive study of the rainfall and cropping patterns of the country using taluk or tehsil as unit of area. It covered several other relevant factors such as orography, land use data, human and livestock populations, soil and climate, the object being to make, as far as possible, an integrated assessment.

1.3 Chapter 14 on Rainfall and Cropping Patterns of the Commission's Report presents a consolidated account of the data collected together with analysis of their inter-relationships on all-India basis. In this analysis the Commission has been greatly benefited by the discussions with the concerned officers of State Governments. It was realised that by condensing the vast amount of information collected from each State into the small space of a chapter, many important and peculiar features of individual States were likely to be missed and hence the data and analysis of each State have presented in separate volumes. The manner of presentation is similar to Chapter 14. It has also been considered desirable to include in each State volume the methodology and suggestions for future cropping patterns, which are pratically the same as given in Chapter 14.

2 METHODOLOGY

2.1 The chief features of the study are (a) use of taluk or tehsil as unit of area for all basic data and analysis; (b) introduction of coded numerical forms to express patterns of distribution of monthly rainfall throughout the year, crops and livestock; (c) inclusion of information on orography, temperature, evapotranspiration, rainfall, soil, irrigation, land use, human and livestock populations and yield performance of crops, all of which influence in different ways and degrees the cropping patterns of a place and (d) presentation of coded information on rainfall, crops and livestock on 1 : 1 million scale maps.

Rainfall Patterns

2.2 A major feature of Indian rainfall is that the southwest monsoon season (June to September) accounts for 70 to 95 per cent of the annual rainfall throughout the country except in the south east peninsula and Kashmir and adjoining hill areas. The monsoon as well as the annual rainfall show large fluctuations from year to year but, as stated in Chapter 13 on Climate and Agriculture, there is no significant

evidence of any trend or periodicity in either of them. Considered in relation to crop production, the total annual or seasonal rainfall does not have much significance and what is important is its distribution during the period of growth of different crops. A relevant question, therefore, is whether rainfall should be examined on a weekly, fortnightly or monthly basis. The coefficient of variation (CV) of monthly rainfall is as high as 40-50 per cent even in the rainiest month of July over most of the central, northern and eastern India. In the south excluding the west coast, CV is higher and varies from 60 to 100 per cent. The variability of weekly or fortnightly rainfall being still greater, makes the use of either of them undependable as indicators of rainfall distribution. For a macro-study like the present, monthly rainfall data which are more dependable and also the most convenient to handle have been used.

2.3 In order to relate crop production with rainfall, certain norms have to be assumed depending on the duration of the crops and their water requirements. On the basis of available information and the fact that most crops mature in about 90 days, the following broad norms have been drawn up :—

(i) Rainfall greater than 30 cm per month (cm pm) for at least three consecutive months would be suitable for a crop like paddy whose water need is very high.

(ii) 20-30 cm pm for not less than three consecutive months would be suitable for crops whose water need is high but less than that of paddy, for example, maize and black gram.

(iii) 10-20 cm pm for at least three consecutive months would be suitable for crops requiring much less water, e.g., bajra and small millets.

(iv) 5-10 cm pm for three consecutive months would be just sufficient for crops which have low water requirements, e.g., *moth* (*P. aconitifolius*) and ephemeral grasses.

(v) Rainfall less than 5 cm pm for three consecutive months is not of much signficance for crop production.

2.4 For denoting the year's rainfall distribution using monthly totals, a convenient code in letter symbols with numerical subscripts explained below, has been evolved. The letters A to E in Table 1 indicate the ranges of monthly rainfall and the subscripts to these refer to the number of months having these ranges of rainfall e.g. A_2 indicates two months with rainfall greater than 30 cm pm. The ranges correspond to those stated in the preceding paragraph.

TABLE 1

Code for Rainfall Data

Symbol	Monthly rainfall cm pm
A+	Greater than 30
B	20—30
C	10—20
D*	5—10
E*	Less than 5

†An examination of monthly rainfall in the country shows that except for areas in the west coast and some hill stations in extreme north-east, normal monthly rainfall seldom exceeds 40 cm.

*In distributions containing ranges of rainfall covered by A or B termed briefly as A & B types amounts less than 10 cm are not so significant and their frequency is generally small. To reduce the number of combinations, D is omitted in A or B type distributions; instead E is used to denote less than 10 cm pm. Thus B_2E_2 would denote two months of 20—30 cm pm and two months less than 10 cm pm rainfall.

The southwest monsoon months of June to September being the principal rainy season dominate the rainfall distributions of the country. To indicate the season's importance, monthly rainfall distribution during June to September is shown in brackets in the annual pattern. To the right of the bracket is the distribution for the post-monsoon months, namely, October to January and to the left that for the pre-monsoon months namely, February to May. In order to explain how such a coded rainfall distribution written in symbols with numerical subscripts has to be interpreted, a hypothetical example may be considered. $D_1\ E_3\ (A_2\ B_1\ C_1)\ C_1\ D_3$, in which for each of the three periods, the symbols are in order of decreasing rainfall which is not necessarily the calendar sequence, can be explained as under :—

(i) $D_1\ E_3$ represents the period February to May in which one month's rainall (usually May) is in the range of 5-10 cm and the remaining three months get less than 5 cm pm.

(ii) $A_2\ B_1\ C_1$ represents the period June to September, in which two months (usually July and August) get more than 30 cm pm rainfall, one month (September) gets 20-30 cm and the remaining month, ie June gets 10-20 cm.

(iii) $C_1\ D_3$ represents the period October to January in which October gets 10-20 cm rainfall and the rest 5-10 cm pm.

Boundaries of Rainfall Zones

2.5 Since differences in monthly, seasonal and annual rainfall are not large within short distances, linear interpolation of rainfall data is permissible. Rainfall data being point measurements, isolines for the same or nearly the same type of distribution of monthly rainfall can, therefore, be drawn. These isolines may not necessarily follow the boundaries of

taluks which are taken to be unit of area in this study and hence for delineation of boundaries the following procedure has been adopted :—

(i) Where variations are small, isolines follow the taluk boundaries;

(ii) where variations are large, isolines delineate the zone boundaries; and

(iii) any taluk, more than three quarters of which lies outside of a zone is not considered a part of that zone.

2.6 If an identical distribution is observed over two or more adjacent taluks a pattern is said to have evolved and the area covered by it is distinguished as a zone and indicated suitably by a Roman numeral. Rainfall patterns have been identified for the whole country using the methodology described above. The data used for the analysis are the monthly normals of rainfall (1901 to 1950)[1] and the patterns and zones are depicted on all-India map which forms part of Chapter 14 on Rainfall and Cropping Patterns of the Commission's Report.

Cropping Patterns

2.7 The basic data for the study of cropping patterns of the country are the areas under different crops in each of the taluks. A large number of crops are grown in a taluk but most of them occupy small areas, often less than one per cent of the total cropped areas of the taluk. With a view to limiting the number of crops constituting a pattern only those crops are considered which individually occupy 10 per cent or more of the gross cropped area of the taluk. In this process, several crops have to be excluded, even though they may be otherwise important. The minimum limit has been fixed at 70 per cent, so that the number of crops, which together cover at least 70 per cent of the gross cropped area, and in which none occupies less than 10 per cent, is not large. Trial computations have shown that in such distributions any crop occupying more than 10 per cent area is rarely omitted and the number of crops hardly exceeds five. When the same distribution holds good for two or more adjacent taluks, a pattern is obtained.

2.8 As in the case of rainfall, percentage area coverage by crop is expressed by means of numerical subscripts affixed to crop symbols shown in Table 2. The list of crops given below is comprehensive and will hold good for all the States.

TABLE 2

Crop Symbols and Area Intervals

Crop	Symbol
1 Rice	Pd
2 wheat	W
3 jowar (kharif)	JK
4 jowar (rabi)	Jr
5 bajra	B
6 maize	M
7 ragi	R
8 small millets	Mt
9 barley	Ba
10 Oats	Oa
11 gram	G
12 pigeonpea (tur)	T
13 pulses other than pigeonpea and gram	Pu
14 groundnut	Gn
15 oilseeds other than groundnut	O
16 cotton	C
17 jute	Ju
18 other fibres	Fb
19 sugarcane	S
20 potato	Pt
21 vegetables	V
22 fruits	Fr
23 tapioca	Ta
24 plantations	L
25 fodder	F
26 chillies	Ch
27 tobacco	To

TABLE 2 (*Contd.*)

Area interval (per cent)	*Subscript*
70 or more	1
50—70	2
30—50	3
10—30	4
less than 10	5

The crop code contains the crop symbol and the appropriate subscript. In writing crop distribution, the first crop has always the highest area but the rest may not necessarily follow the order of decreasing areas. For example, crop distribution, C_3 Jr_4 Mt_4, means that cotton area is 30-50 per cent, and jowar rabi and millets each occupies 10-30 per cent of the gross cropped area, the total being 70 per cent or more. Two or more taluks having the same distribution of crops constitute a pattern. Cropping patterns so derived have been indicated on maps of 1:1 million size.

Relative Yield Index of Crops

2.9 Besides the absolute figures, the yield of a crop has also been expressed as per cent of all-India average which is called Relative Yield Index (RYI). Relative Yield Index values have been computed for the principal crop on the basis of (1968-69 to 1970-71) data available in the records of the Directorate of Economics and Statistics, Ministry of Agriculture and Irrigation.

Livestock Patterns

2.10 The livestock patterns are relevant only insofar as these are related to production of fodder and feeds. As talukwise data were not available for the livestock Census, 1972, those of 1966 Census as published by the States have been used. The animals considered for livestock analysis are shown in Table 3 together with their symbols.

1 Memoirs of India Meteorological Department, Volume XXXI, Part 3, 1962.

TABLE 3

Livestock Symbols

Category	Symbol
cattle :	
male	
(over 3 years)	Cm
female	
(over 3 years)	Cf
young stock	
(under 3 years)	Cy
buffaloes :	
male	
(over 3 years)	Bm
female	
(over 3 years)	Bf
young stock	
(under 3 years)	By
sheep	S
goats	G
horses, mules and ponies	H
donkeys	D
camels	Ca
pigs	P

The livestock patterns are expressed in coded form in the same manner as the cropping pattern.

Soils

2.11 Soil data on a taluk basis are not available for all the areas of the country. As such, soils have been discussed in a general manner using the traditional nomenclature in describing their characteristics.

Other Data

2.12 The sources of other data featuring in the study are given below :

item	*source*
taluk area	States' Census Reports 1971 or from the data furnished by the States in their land-use returns.
orography	maps of the Survey of India, and National Atlas Organisation
temperature	Climatological Tables of Observatories in India, India Meteorological Department, 1931—1960 normals.
evapotranspiration	Scientific Report No. 136 of the India Meteorological Department, 1971.
human population	Census of India, 1971
irrigation and land use statistics	basic data pertaining to land utilisation statistics obtained from the States and refer mostly to 1969-70.

Presentation of Information

2.13 The tables required for following the text are given in the text itself at appropriate places, whereas the basic data are appended as follows :

APPENDIX 1	Talukwise Land Use (1969-70) and Population Statistics, (arranged according to States rainfall zones).
APPENDIX 2	Districtwise Livestock Population 1966.
APPENDIX 3	Zonewise Information on Rainfall, Rainy days and Cropping Patterns.
APPENDIX 4	Zonewise area under Principal Crops.

2.14 Rainfall, cropping and livestock patterns of each State are indicated on maps in the 1:1 million scale and given in Appendices 5, 6 and 7 respectively.

In the case of rainfall patterns, the zonal numbers in State maps have been given in Roman numeral and their all-India equivalents as used in Chapter 14 of the Commission's Report have been shown in three digit Arabic numerals within brackets.

3 GENERAL FEATURES

3.1 The State has an area of 4.4 lakh sq km and consists of 43 districts with an average area of about 10,000 sq km. Twenty districts have areas less than the average. The distribution of districts according to size is as follows :

Range of area in '000 sq kms	Less than 5	5-10	10-15	15-20	20-25	Above 25
No. of districts	4	16	18	2	2	1

3.2 The total number of taluks in the State is 190 and the average area of a taluk comes to a little over 2,000 sq km. Only seventy taluks have more than the average area and the rest are below the average size.

Elevation

3.3 Orography shows wide variations from less than 150 metres to 1,600 metres above sea level (masl) (metres above sea level). The Bhind and Datia districts, their neighbourhood and a small number of scattered taluks in districts of Panna, Rewa, Sidhi, Bastar and Khargone have a minimum elevation of 150 masl, which is the lowest for the State. In the rest of the State, minimum elevation is 300 masl. From the distribution of taluks according to elevation shown below it is seen that the maximum elevation in two-thirds of the taluks exceeds 500 masl. Those over 1,000 masl, constitute only 7 per cent and are listed in Table 4 which gives the elevations of selected taluks in the State. Narsimhpur, Sohagpur and Betul are the areas at highest elevations in the State. Another group of elevated areas is east-Surguja, Chhindwara, Raigarh, Bilaspur and Bastar.

Maximum height masl.	*below* 500	500-750	750-1000	1000-1250	1250-1500	1500-1750
no of taluks	64	88	25	10	2	1
% of total	34	46	13	5	2	

TABLE 4

Elevation of Selected Taluks of Madhya Pradesh

(metres above sea level)

Taluk	District	Minimum	Maximum	Difference
Chhindwara	Chhindwara	450	1164	714
Amarwara	,,	450	1061	611
Narsimhpur	Narsimhpur	600	1598	998
Betul	Betul	450	1350	900
Sohagpur	Hoshangabad	345	1350	1005
Pal	Surguja	450	1225	775
Ambikapur	,,	300	1152	852
Bharatpur	,,	300	1025	726
Joshpur	Raigarh	300	1035	735
Bilaspur	Bilaspur	246	1057	811
Dantewara	Bastar	450	1240	790
Sohagpur	Shahdol	300	1127	827
Pushprajgarh		300	1027	727

3.4 The differences between the maximum and minimum elevations given below in the form of a frequency table indicate that Madhya Pradesh has high and varying elevations and constitute a major plateau area of the country.

Range of difference between max. and minimum heights (metres)	Less than 50	51-100	101-200	201-300	301-400	greater than 400	total
no. of taluks	26	29	53	23	19	40	190

Population

3.5 The population of the State according to 1971 Census is 41.65 million. This corresponds to an average density of 94 persons per sq km which is about half of the all-India average. The rural population is 84 per cent of the total and in 33 of the 43 districts it is more than 80 per cent of the total population. Only in Gwalior and Indore rural population is of a lower order viz. 48 and 37 per cent of the total population. Table 5 shows the density of population in different districts and taluks. According to the figures given in Table 5, only 3 per cent of taluks have a population density of 50 or less, 79 per cent between 51 and 150, and the remaining 18 per cent above 151 per square km.

TABLE 5

Number of Taluks in different ranges of Population Density

District	Population density (persons per sq km)	Number of Taluks in population density (per sq km) ranges: 1-50	51-100	101-150	151-200	201-250	251-300	301-500	500
1	2	3	4	5	6	7	8	9	10
Morena	84	2	—	2	2	—	—	—	—
Bhind	178	—	—	1	2	1	—	—	—
Gwalior	164	—	—	2	—	1	—	—	—
Datia	125	—	—	2	—	—	—	—	—
Shivpuri	67	—	5	—	—	—	—	—	—
Guna	71	—	5	—	—	—	—	—	—
Tikamgarh	123	—	—	3	—	—	—	—	—
Chhatarpur	83	—	2	1	—	—	—	—	—
Panna	67	—	2	1	—	—	—	—	—
Satna	123	—	1	3	—	—	—	—	—
Rewa	156	—	—	2	1	1	—	—	—
Shahdol	74	—	4	—	—	—	—	—	—
Sidhi	75	—	3	—	—	—	—	—	—
Mandsaur	102	—	5	1	2	—	—	—	—
Ratlam	129	—	1	2	1	—	—	—	—
Ujjain	142	—	—	4	—	1	—	—	—
Jhabua	98	—	2	3	—	—	—	—	—
Dhar	103	—	3	2	—	—	—	—	—
Indore	290	—	—	2	1	—	—	—	1
Dewas	88	—	3	1	1	—	—	—	—
Khargone (West Nimar)	131	—	2	4	2	—	—	—	—
Khandwa (East Nimar)	138	—	1	1	—	1	—	—	—
Shajapur	110	—	2	2	—	—	—	—	—
Rajgarh	105	—	2	3	—	—	—	—	—
Vidisha	90	—	3	2	—	—	—	—	—
Sehore	116	—	4	1	—	—	—	1	—
Raisen	73	—	6	1	—	—	—	—	—
Hoshangabad	108	—	3	1	—	—	—	—	—
Betul	104	—	1	2	—	—	—	—	—
Sagar	128	—	—	3	1	—	—	—	—

TABLE 5 (*Contd.*)

1	2	3	4	5	6	7	8	9	10
Damoh	109	—	1	1	—	—	—	—	—
Jabalpur	182	—	—	3	—	—	—	1	—
Narsimhapur	116	—	—	2	—	—	—	—	—
Mandla	106	—	1	2	—	—	—	—	—
Chhindwara	98	—	1	2	—	—	—	—	—
Seoni	101	—	1	1	—	—	—	—	—
Balaghat	148	—	1	—	1	1	—	—	—
Surguja	73	2	3	2	—	—	—	—	—
Bilaspur	95	—	1	—	3	1	—	—	—
Raigarh	126	—	1	2	—	2	—	—	—
Durg	158	—	—	4	1	1	—	—	—
Raipur	173	—	1	—	3	—	1	—	—
Bastar	72	1	4	3	—	—	—	—	—
State	94	5	75	74	21	10	1	2	1
Percentage of Taluks in different population density ranges		3	40	39	11	5	0·5	1	0·5

Land Use

3.6 Forests account for 33 per cent of the area in the State and 10 per cent land is not available for cultivation. Permanent pastures and other grazing lands occupy 7 per cent while 4 per cent constitute fallow lands. Net sown area is only 41.5 per cent while area sown more than once is 5 per cent. There are marked variations in land use pattern at the District level. Districtwise land use patterns are given in Table 6 below :

TABLE 6

Districtwise Land Use Statistics—1969-70

MADHYA PRADESH

(Percent of total reporting area)

District	Geographical area (sq km)	Forest	Not available for cultivation	Permanent pastures	Land under misc. trees, crops and groves	Culturable waste	Fallow lands	Net area sown
1	2	3	4	5	6	7	8	9
Raipur	21251	38·3	6·4	6·7	—	3·0	3·4	42·2
Durg	19670	25·6	7·6	7·3	—	1·7	4·6	53·2
Bastar	39060	67·4	4·6	6·0	—	1·3	2·7	18·0
Bilaspur	19905	40·6	6·8	6·8	—	1·8	3·0	41·0
Raigarh	12910	32.1	14·0	8·3	—	1·4	5·2	39·0
Surguja	22337	54·7	5·6	6·9	2·7	1·8	4·0	24·3
Jabalpur	10164	17·0	12·2	11·0	0·4	6·3	6·6	46·5
Balaghat	9245	54·9	5·9	4·1	0·3	2·6	2·4	29·8
Chhindwara	11824	38·4	7·9	4·5	0·1	3·3	5·5	40·3
Sagar	10246	28·7	5·5	10·8	0·1	3·6	1·6	49·7
Narsinghpur	5138	26·6	4·6	9·3	0·4	3·8	2·6	52·7
Seoni	8752	37·0	4·9	4·8	0·1	3·6	7·4	42·2
Damoh	7301	37·3	7·2	9·8	0·5	5·6	1·9	37·7
Mandla	13257	44·1	8·2	3·6	—	3·1	9·6	31·4
Rewa	6315	10·6	15·8	5·4	0·3	3·0	7·8	57·1
Sidhi	10532	41·6	18·2	—	—	4·1	5·7	30·4
Satna	7495	18·2	18·9	3·6	1·3	7·8	4·8	45·4
Panna	7122	34·7	18·4	1·8	—	11·1	5·1	28·9
Chattarpur	8690	10·2	17·3	6·2	—	20·8	2·7	24·8
Teekamgarh	5047	13·0	14·3	15·2	—	10·2	4·7	42·6
Shahdol	14028	35·5	10·8	3·6	0·2	7·7	9·4	32·8
Indore	3910	13·6	7·6	10·1	—	1·6	0·7	66·3
Ratlam	4859	7·6	11·0	10·9	—	9·3	1·4	60·3
Ujjain	6081	0·7	7·4	12·7	—	3·7	1·0	74·6
Mandsaur	9726	17·2	20·3	8·1	—	4·7	0·5	49·8
Dewas	7014	31·3	6·2	12·5	—	1·7	0·8	47·5

TABLE 6 (*Contd*).

1	2	3	4	5	6	7	8	9
Dhar	8149	9·3	14·7	12·4	—	3·5	1·2	59·1
Jhabua	6781	16·5	20·3	8·9	—	2·8	2·6	48·8
West-Nimar (Khargone)	13441	35·2	7·8	0·7	—	3·2	0·7	45·8
East-Nimar (Khandwa)	10705	43·1	5·5	9·4	0·4	3·1	1·3	39·8
Gwalior	5213	20·8	17·8	5·9	—	6·3	2·5	46·3
Bhind	4467	1·6	13·1	6·7	0·1	1·5	1·0	75·5
Morena	11586	27·9	22·8	6·4	—	8·9	1·3	33·0
Shivpuri	10285	19·0	15·9	8·8	3·2	14·8	5·0	33·3
Guna	11017	14·2	14·6	7·8	—	13·5	1·5	48·5
Datia	2034	9·3	11·8	3·6	0·8	8·9	3·0	62·6
Sehore	9015	24·3	6·5	12·8	—	3·5	0·6	52·1
Raisen	8395	40·5	4·2	3·8	—	5·4	0·6	45·5
Vidisa	7433	11·1	7·8	7·0	—	5·9	1·2	67·0
H. Bad	10016	36·8	5·4	7·4	0·1	4·5	1·8	44·2
Betul	10011	41·5	6·7	2·3	—	5·1	5·6	39·3
Rajgarh	6163	2·3	9·9	15·6	—	6·9	1·5	64·0
Shajapur	6201	0·5	11·9	8·7	0·4	5·7	4·3	49·7
State	442841	32·6	9·9	7·3	0·3	4·8	3·6	41·5

The distribution of forest area computed from the table is as follows :

Area per cent	Less than 10	10-20	21-30	31-40	41-50	51-60	61-70
no. of districts	7	11	6	11	5	2	1

3.7 According to Table 6, in about 50 per cent of the districts more than 10 per cent area is not available for cultivation. Morena, the northwestern district, and the extreme west districts of Jhabua and Mandsaur have 20 to 23 per cent area which is not available for cultivation. The northern boundary districts from Tikamgarh, Rewa to Sidhi and Raigarh have from 14 to 18 per cent area not available for cultivation.

3.8 Twenty-three districts have 5 to 10 per cent area under permanent pastures and 9 districts have 11 to 16 per cent of such areas. Fallow lands constitute below 10 per cent of the area in all the districts. In more than two-thirds of the districts, they cover less than 5 per cent of the total area. The net sown areas range from 18 per cent in Bastar to 75.5 per cent in Bhind. The net sown area in 24 districts ranges between 40 and 60 per cent and is above 60 per cent in 6 districts.

Soils

3.9 Five main soil types viz., red sandy, red and brown, mixed red and black, skeletal and black soils have been distinguished in the State. Almost the entire area to the east of Long. 81°E, excluding certain northeastern area, is dominated by black soils, most of them being medium black. The districts covered by the different soils are given below :

(i) Red sandy soils Bastar, south western part of Durg and a small area adjoining Balaghat in the northern portions of Satna, Chhatarpur and in Datia.

(ii) Rewa, Sidhi, Shaddal (east half), Surguja, Mandla (east half), Bilaspur, Raipur and Durg (remaining part) have red and brown soils. Of these, Raipur, Bilaspur and Durg have patches of deep black soils.

(iii) Mixed red and black soils prevail in Tikamgarh, most of Chhatarpur, Panna and Satna, extending up to the eastern parts of Shivpuri, Gwalior and Bhind.

(iv) Skeletal soils cover eastern parts of Sehore, Raisan and Sangor.

(a) Deep black soils cover Narsimhpur, Hoshangabad and parts of Sehore, Dewas, Raisen, Saugar and Damoh.

(b) Shallow black soils are prevalent over most of Betul, Chhindwara, Seoni and western half of Balaghat and adjoining western areas of Mandla.

(c) Mixed red and black soils are present in small northern areas of Betul and Chhindwara.

(d) The rest of the areas are under medium black soils.

Irrigation

3.10 The net irrigated area rose from 1.43 million ha, ie (7.8 per cent)in 1969-70, to 1.64 Mha (ie, 8.9 per cent) in 1971-72. Area irrigated more than once similarly rose from 40,000 ha in 1969-70 to 60,000 ha in 1971-72. The ratio of gross irrigated to gross cropped area was only 8.9 per cent in 1971-72. Average irrigation intensity is 113 per cent for the State and in only 10 districts it is above 120 per cent. There are only five districts each having more than a lakh hectares of net irrigated area (vide table 7) but they account for more than 30 per cent of the entire irrigated area. Districtwise net irrigated area is given in Table 7. Nearly half the irrigated area in 1971-72 was by canals. Wells accounted for 36 per cent and tanks 9 per cent. Eighty per cent of the irrigation in Raipur, which has the largest irrigated area in the State is by canals and tanks account for 13 per cent. Well irrigation in this district is negligible.

TABLE 7

Irrigated Area in Selected Districts of Madhya Pradesh—1969-7

District	Net irrigated area ('000 ha)	Net irrigated net sown area as per-cent of
Raipur	219	24
Durg	141	14
Bilaspur	114	14
Balaghat	106	38
Morena	107	28

Rainfall

3.11 A map showing the Rainfall Patterns in the State is given at Appendix 5. The analysis of rainfall data together with that of the crop and livestock patterns is presented in the next section. However, a general idea of rainfall distribution is briefly given here. The annual rainfall of the State is 121 cm in 57 rainy days. The eastern region receives heavier rainfall with an average of 140 cm in 57 rainy days whereas the western region has an average of 104 cm in 49 rainy days. Monthly and annual rainfall and variability for the two regions are shown below :

	Jan	*Feb*	*Mar*	*Apr*	*May*	*June*	*July*	*Aug*	*Sept*	*Oct*	*Nov*	*Dec*	*Annual*
Madhya Pradesh East													
Rainfall (cm.)	2	3	2	2	2	19	43	39	22	6	2	1	140
rainy days (numbers)	1	2	2	1	2	9	18	17	11	3	1	1	67
co-officient of variation (cv)%	127	89	120	125	102	47	23	25	34	85	137	169	13
Madhya Pradesh West													
Rainfall (cm.)	1	1	1	—	1	13	35	29	18	3	2	1	104
rainy days (numbers)	1	1	1	—	1	7	14	13	8	2	1	1	49
cv(%)	114	110	131	151	130	53	29	35	50	114	172	15	18

3.12 The chief features of monthly rainfall for the pre-monsoon, monsoon and post-monsoon periods are briefly stated below :

February to May

During February to May, the rainfall varies between 1 and 5 cm but no month has rainfall more than 5 cm pm. Bastar alone gets the highest rainfall during this period.

June to September

Except for the north and northwest areas, June rainfall exceeds 10 cm. In Bastar and adjoining areas, June rainfall ranges between 20 and 30 cm. Excepting a few northern most districts, July has a much heavier rainfall being more than 40 cm over almost the entire area to the east and south of Bhopal; besides, there are few pockets having 50 cm in Bastar, Jabalpur and adjoining areas. August rainfall distribution is nearly similar to July but somewhat less severe; September rainfall is still lower being a little more than 20 cm in the east but generally in the range of 15-20 cm elsewhere. Thus, areas to the east of the north-south line running through Bhopal get more than 30 cm. pm. rainfall during July and August and 20-30 cm in September. June rainfall is, with the exception of Bastar and adjoining areas, between 10 and 20 cm.

October-January

October rainfall is more than 5 cm. to the east and south of the northwest line through Jabalpur; elsewhere it is less than 5 cm. The other months of this period get small and mostly negligible amounts of rainfall.

Rainfall variability

3.13 The coefficient of variation (cv) in June over the south eastern portion of the State is less than 60 per cent but ranges from 60 to 80 per cent or even higher over a large part of the State indicating a high degree of uncertainty. July rainfall is high and hence cv is low. In the eastern half, cv is less than 40 per cent but in the rest of the State it varies from 40 to 50 per cent. When compared to large areas of the country, cv in Madhya Pradesh particularly in eastern part is significantly less. For example, over most of the peninsula cv ranges between 60 and 100 per cent. Variability of rainfall in August is nearly similar to July. It increases and ranges from 60 to 80 per cent in September excepting in south-eastern region of the State. Taking the monsoon period as a whole, the variability is less than 30 per cent over most of the areas, excepting those in the east of Jabalpur and north of Bastar where it is less than 15 per cent. The variability in annual rainfall is similar to that in the monsoon period.

Temperature

3.14 Normals of maximum, minimum and mean daily temperatures which are recorded by about two dozen observatory stations in the State are given in Tables 8-10. Some of the important features of the temperature data are described below :

(i) Mean daily maximum temperatures recorded in May are highest varying between 38° and 43°C except in Pachmarhi. Temperature declines from June to September when it varies from 25° to 33°C.

(ii) The mean annual maximum temperature is generally 31.6°±1°C.

(iii) Mean daily temperature is the arithmetic mean of the maximum and minimum temperatures. On the basis of mean daily temperature, May is the hottest month with an average of 34°C. The average mean daily temperatures in June and July are 32° and 27°C respectively. August and September are cooler by half a degree. The constancy of mean temperatures from July to September is a characteristic feature of the area.

Potential Evapotranspiration (PE)

3.15 Monthly and annual values of potential evapotranspiration (PE) worked out on the basis of Penman's formula for 25 observatory stations in the State are given in Table 11. Brief remarks on their variations in different periods throughout the year are given below :

May-September

In Madhya Pradesh east, the May average PE is about 20 cm but decreases in June to 15 cm or so. PE further declines to 10-11 cm in July and to 9-11 in August. The September PE is similar to that of July. In Madhya Pradesh West, the monthly PE values are slightly higher, e.g., in May, it varies from 20 to 23 cm and in June from 17-22 cm. Similarly, July-August PE values are 10-13 cm and that in September 9-12 cm.

Annual

The anual PE is nearly uniform over Madhya Pradesh East with an average of 143 cm. Over Madhya Pradesh West the average PE values are about 10 cm higher than that of the Eastern Region.

Climatic Classification

3.16 The State is divided into three major climatic regions. The entire area to the east of the line passing through Seoni, Jabalpur and Shahdol is moist—sub-humid. The adjoining area in the west extending up to the line bounded by Betul, Bhopal, Guna and Tikamgarh is dry sub-humid. The rest of the State in the west and the north is semi-arid.

TABLE 8

Normals of Daily Maximum Temperature (°C)

Station	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual
Gwalior	23·2	26·6	32·9	38·5	42·6	40·8	34·1	31·9	32·4	33·2	29·4	24·8	32·5
Nowgong	24·3	27·5	33·4	38·8	42·7	40·0	32·9	31·3	32·5	32·9	29·1	25·3	32·6
Guna	24·8	27·8	33·1	38·0	41·5	38·5	31·1	29·5	30·7	32·0	28·9	26·0	31·8
Neemuch	24·7	27·6	32·7	37·2	40·0	36·9	30·9	29·3	30·7	32·5	29·3	26·2	31·5
Sagar	24·5	27·4	32·7	37·3	40·7	36·9	29·7	28·4	29·3	30·5	27·7	25·4	30·9
Bhopal	25·7	28·5	33·6	37·8	40·7	36·9	29·9	28·6	30·1	31·3	28·5	26·1	31·5
Hoshangabad	26·6	29·8	34·9	39·3	42·0	37·6	30·2	29·2	30·7	32·1	29·3	27·1	32·4
Indore	26·1	28·9	33·7	37·7	39·9	35·7	29·5	28·2	29·3	31·1	28·8	26·7	31·3
Seoni	25·4	28·6	33·4	37·3	40·4	35·5	28·7	28·3	29·2	29·7	27·5	26·1	30·8
Khandwa	29·3	31·9	36·4	40·2	41·9	37·5	30·9	29·9	31·0	33·4	31·2	29·6	33·6
Satna	24·7	27·3	33·1	38·4	42·1	39·1	31·9	30·5	31·5	31·8	28·9	25·8	32·1
Umaria	25·0	27·7	32·9	37·9	41·4	37·6	30·6	29·4	30·5	30·6	27·6	25·6	31·4
Jabalpur	26·1	28·9	34·0	38·5	41·9	37·6	30·3	29·5	30·8	31·4	28·9	26·9	32·1
Pendra	24·0	26·5	31·5	36·0	39·3	33·6	28·7	28·3	28·9	28·5	26·3	24·2	29·7
Raipur	27·7	30·3	34·7	39·2	42·3	37·5	30·3	30·1	31·0	31·2	29·1	27·3	32·6
Kanker	27·9	30·2	34·4	37·8	40·3	35·6	29·1	29·1	29·9	30·2	28·3	27·1	31·6
Jagdalpur	28·5	31·0	34·7	36·9	38·3	33·5	28·1	28·4	29·5	29·5	28·1	27·4	31·2
Sheopur	24·5	28·4	34·2	38·8	42·4	40·4	33·8	31·3	32·5	32·9	29·4	26·1	32·9
Ratlam	26·3	29·8	34·1	37·7	39·5	36·2	30·2	28·3	30·2	32·3	30·3	28·2	31·9
Chhindwara	25·5	29·0	32·9	36·4	39·4	35·2	28·4	27·7	29·0	29·3	27·7	26·3	30·6
Betul	26·4	29·8	33·6	37·0	39·3	35·0	28·1	26·9	28·3	29·3	27·7	27·0	30·7
Ambikapur	23·9	27·1	31·8	26·6	39·6	35·8	29·5	29·2	29·5	29·0	26·0	24·2	30·2
Mandla	26·0	29·3	33·7	37·9	41·3	37·5	30·1	29·2	30·2	30·5	28·1	26·6	31·7
Champa	27·5	31·1	35·3	39·9	43·0	38·9	31·4	30·8	31·5	31·4	29·3	37·8	33·2
Raigarh	28·4	31·9	35·7	40·3	42·8	38·6	31·5	31·0	31·8	31·9	29·8	28·4	33·5
Pachmarhi	22·4	24·7	28·9	33·4	36·0	31·4	24·3	23·8	25·2	26·2	24·1	22·8	26·9

TABLE 9

Normals of Daily Minimum Temperature (°C)

Station	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual
Gwalior	7·5	10·0	16·0	22·3	28·0	30·2	26·6	25·4	24·4	18·0	10·5	7·2	18·8
Nowgong	7·7	9·9	14·8	20·5	26·4	28·3	25·4	24·8	23·6	17·8	10·5	7·5	18·1
Guna	8·2	10·2	14·9	20·3	25·8	26·6	24·0	23·1	22·1	17·1	10·6	7·9	17·6
Nimuch	9·5	11·9	16·8	22·0	26·1	25·9	23·8	23·0	22·1	18·6	13·2	10·1	18·6
Sagar	11·6	13·9	18·5	23·3	27·0	25·7	22·9	22·2	21·7	19·2	15·5	12·9	19·5
Bhopal	10·4	12·5	17·1	21·2	26·4	26·4	23·2	22·5	21·9	18·0	13·3	10·6	18·5
Hoshangabad	12·7	14·3	18·6	23·5	27·6	26·6	24·0	23·5	23·2	19·5	14·5	12·3	20·0
Indore	9·6	11·0	15·3	20·4	24·8	24·4	22·6	22·0	21·0	17·2	12·1	9·9	17·5
Seoni	11·5	13·3	17·4	21·7	25·5	24·4	22·4	22·1	21·6	18·4	13·3	10·9	18·5
Khandwa	12·0	13·6	18·1	23·9	27·9	26·2	23·8	23·2	22·7	18·9	13·5	11·2	19·6
Satna	9·0	11·1	16·0	21·7	26·9	28·0	25·1	24·5	23·8	18·8	11·6	8·4	18·7
Umaria	9·0	10·8	15·3	21·1	26·5	26·8	24·0	23·5	22·8	17·6	10·8	8·0	18·0
Jabalpur	9·8	11·4	15·5	20·5	25·9	26·4	23·9	23·6	23·1	18·4	11·7	9·0	18·3
Pendra	10·9	12·5	17·6	22·3	26·1	25·0	22·8	22·5	22·0	18·4	13·4	10·1	18·6
Raipur	13·5	16·2	20·5	25·1	28·8	26·8	24·1	24·1	24·1	21·5	16·0	13·2	21.2
Kanker	12·1	14·6	18·8	23·8	27·2	26·0	23·6	23·5	23·1	20·1	14·2	11·2	19·9
Jagdalpur	11·0	14·3	18·4	22·2	24·6	23·9	22·2	22·2	22·3	19·9	14·7	11·3	18·9
Sheopur	7·8	9·9	16·0	21·3	26·8	28·6	25·9	24·7	23·5	18·4	11·0	8·3	18·5
Ratlam	11·0	13·3	18·1	22·6	25·9	25·3	23·4	22·6	22·0	19·1	14·6	12·3	19·2
Chhindwara	10·6	12·8	17·0	21·9	26·1	24·9	22·4	21·9	21·3	17·7	11·8	9·8	18·2
Betul	11·1	12·5	16·5	21.1	24·8	24·4	22·3	21·7	21·0	17·2	12·0	10·3	17·9
Ambikapur	8·6	10·4	15·0	20·3	24·8	25·1	23·2	22·9	22·1	18·0	10·5	8·0	17·4
Mandla	8·8	10·1	14·1	19·1	24·3	25·3	23·3	23·1	22·3	17·6	9·9	7·8	17·1
Champa	13·8	16·2	20·0	24·9	28·9	27·8	24·9	24·9	24·7	22·0	16·1	13·7	21·5
Raigarh	13·6	15·9	20·2	25·4	28·9	27·7	25·0	24·9	24·7	22·3	16·4	13·4	21·5
Pachmarhi	8·7	10·4	14·8	20·1	24·3	22·5	19·9	19·6	19·1	14·8	9·6	7·5	15·9

TABLE 10

Normals of Daily Mean Temperature (°C)

Station	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual
Gwalior	15·4	18·3	24·5	30·4	35·3	35·5	30·4	28·7	28·4	25·6	20·0	16·0	25·7
Nowgong	16·0	18·7	24·1	29·7	34·6	34·2	29·2	28·1	28·1	25·4	19·8	16·4	25·4
Guna	16·5	19·0	24·0	29·2	33·7	32·6	27·6	26·3	26·4	24·6	19·8	17·0	24·7
Nimuch	17·1	19·8	24·8	29·6	33·1	31·4	27·4	26·2	26·4	25·6	21·3	18·2	25·1
Sagar	18·1	20·7	25·6	30·3	33·9	31·3	26·3	25·3	25·5	24·9	21·6	19·2	25·3
Bhopal	18·1	20·5	25·4	29·5	33·6	31·2	26·6	25·6	26·0	24·7	20·9	18·4	25·1
Hoshangabad	19·7	22·1	26·8	31·4	34·8	32·1	27·1	26·4	27·0	25·8	21·9	19·7	26·3
Indore	17·9	20·0	24·5	29·1	32·4	30·1	26·1	25·1	25·2	24·2	20·5	18·3	24·5
Seoni	18·5	21·0	25·4	29·5	33·0	30·0	25·6	25·2	25·4	24·1	20·4	18·5	24·7
Khandwa	20·7	22·8	27·3	32·1	34·9	31·9	27·4	26·6	26·9	26·2	22·4	20·4	26·6
Satna	16·9	19·2	24·6	30·1	34·5	33·6	28·5	27·5	27·7	25·3	20·3	17·1	25·5
Umaria	17·0	19·3	24·1	29·5	34·0	32·2	27·3	26·5	26·7	25·1	19·2	16·8	24·8
Jabalpur	18·0	20·2	24·8	29·5	33·9	32·0	27·1	26·6	27·0	24·9	20·3	18·0	25·2
Pendra	17·5	19·5	24·6	29·2	32·7	29·3	25·8	25·4	25·5	23·5	19·9	17·2	24·2
Raipur	20·6	23·3	27·6	32·2	35·6	32·2	27·2	27·1	27·6	26·4	22·6	20·3	26·9
Kanker	20·0	22·4	26·6	30·8	33·8	30·7	26·4	25·3	26·5	25·2	21·3	19·2	25·8
Jagdalpur	19·8	22·7	26·6	29·6	31·5	28·7	25·2	25·3	25·9	24·7	21·4	19·4	25·1
Sheopur	16·2	19·2	25·1	30·1	34·6	34·5	29·9	28·0	28·9	25·7	20·2	17·2	25·8
Ratlam	18·7	21·6	26·1	30·2	32·7	30·8	26·8	25·5	26·1	25·7	22·5	20·3	25·6
Chhindwara	18·1	20·9	25·0	29·2	32·8	30·1	25·4	24·8	25·2	23·5	19·8	18·1	24·4
Betul	18·8	21·2	25·1	29·1	32·1	29·7	25·2	24·3	24·7	23·3	19·9	18·7	24·4
Ambikapur	16·3	18·8	23·4	28·5	32·2	30·5	26·4	26·1	25·8	23·5	18·3	16·1	23·8
Mandla	17·4	19·7	23·9	28·5	32·8	31·4	26·7	26·2	26·3	24·1	19·0	17·2	24·5
Champa	20·7	23·7	27·7	32·4	36·0	33·4	28·2	27·9	28·1	26·7	22·7	20·8	27·4
Raigarh	21·0	23·9	28·0	32·9	35·9	33·2	28·3	28·0	28·3	27·1	23·1	20·9	27·6
Pachmarhi	15·6	17·6	21·9	26·8	30·2	27·0	22·1	21·7	22·2	20·5	16·9	15·2	21·5

TABLE 11

Mean Daily Patential Evapotranspiration (PE)

(Unit—milimeters)

Station	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual
Gwalior	58·9	80·5	134·2	171·5	218·5	219·8	139·1	113·5	126·2	115·5	71·1	52·3	1503·1
Nowgong	58·7	81·1	128·8	163·4	209·0	193·0	126·5	111·0	118·6	113·6	71·0	53·2	1428·3
Guna	66·6	85·8	136·3	174·0	228·0	210·8	131·3	111·4	118·5	114·3	74·0	59·4	1512·0
Nimuch	75·5	96·3	145·5	184·5	244·3	207·8	131·5	113·4	123·1	123·2	85·1	70·4	1600·7
Sagar	81·2	100·9	154·3	186·1	222·7	181·6	107·5	99·1	109·9	125·2	95·1	79·3	1543·1
Bhopal	79·6	99·4	149·0	183·1	236·0	191·5	118·4	104·9	115·3	119·6	85·5	70·5	1553·5
Hoshangabad	79·5	96·3	140·3	166·4	201·6	165·6	105·5	97·7	106·0	116·2	85·1	72·5	1433·3
Indore	92·8	115·6	176·8	219·9	299·7	224·1	133·3	119·0	123·1	132·6	95·1	80·2	1813·2
Seoni	79·6	99·8	145·4	169·5	195·8	151·5	100·6	97·6	104·0	116·9	86·7	72·2	1419·6
Khandwa	93·9	112·5	164·9	206·7	265·4	207·1	127·4	119·3	122·8	130·9	95·1	81·9	1728·5
Satna	63·8	84·2	137·0	173·0	213·3	191·3	120·1	107·6	114·9	114·0	75·0	58·0	1452·7
Umeria	64·3	83·8	129·9	163·8	195·8	165·1	104·3	96·2	101·5	106·2	73·1	58·3	1343·0
Jabalpur	69·6	88·8	134·9	165·0	203·2	172·6	105·8	99·3	107·4	112·7	78·3	63·2	1401·3
Pendra	74·0	94·1	144·6	172·6	208·8	155·1	100·7	103·6	103·3	104·7	80·3	66·1	1408·4
Raipur	88·5	109·9	160·8	193·9	232·3	178·1	113·4	110·0	111·5	124·3	93·2	80·6	1597·0
Kanker	79·6	99·8	149·3	174·4	201·7	154·9	117·0	103·4	103·6	109·8	85·2	72·9	1452·2
Jagdalpur	84·2	104·3	147·1	166·5	180·3	136·8	102·0	101·5	100·1	105·5	86·8	76·8	1392·9
Sheopur	64·8	85·4	139·5	173·3	225·3	204·2	127·4	107·7	119·1	117·2	76·2	59·0	1499·5
Ratlam	86·5	105·6	149·5	180·5	221·4	171·0	108·6	93·5	106·6	121·3	94·3	81·1	1519·4
Chhindwara	76·6	97·4	140·4	167·8	199·4	166·4	109·6	102·2	107·1	109·0	83·0	68·9	1428·2
Betul	80·4	98·4	141·1	163·8	195·1	151·2	96·4	88·3	94·1	107·3	82·9	72·6	1372·1
Ambikapur.	69·0	92·2	143·1	177·2	212·4	177·9	122·7	112·7	113·7	111·0	77·0	62·3	1471·9
Mandla	65·5	83·8	125·0	152·5	185·8	158·9	101·9	94·9	100·8	100·5	72·5	59·1	1301·8
Champa	84·0	105·8	148·2	173·8	202·9	165·4	108·9	100·7	102·3	113·0	93·4	76·6	1475·4
Raigarh	85·0	105·3	149·7	178·0	207·0	166·0	108·6	101·5	103·4	117·1	93·0	77·3	1492·4

4 RAINFALL ZONES, THEIR CROPPING AND LIVESTOCK PATTERNS

4.1 The State is divided into 13 rainfall zones. These are indicated below together with the number of taluks included in each and their approximate areas. Three pairs of Zones xiz VI and VII, IX and X and XI and XII differ slightly between themselves, only because of the October rainfall. Otherwise each pair could be combined to constitute a single zone. Ten out of the thirteen zones are larger than 10,000 sq km in area, the largest being zone XIII.

Rainfall zone	*All-India rainfall zone**	*Rainfall pattern*	*Number of taluks with total approximate area in sq km*
I	105	$E_4 (C_4) E_4$	3 (4211)
II	093	$E_4 (B_1 C_3) E_4$	8 (12303)
III	086	$E_4 (B_2 C_1 E_1)$	31 (46939)
IV	082	$E_4 (B_2 C_2) E_4$	21 (25952)
V	061	$E_4 (A_1 B_1 C_1 E_1) E_4$	6 (9179
VI	064	$E_4 (A_1 B_1 C_2) E_4$	13 (28760)
VII	065	$E_4 (A_1 B_1 C_2) D_1 E_3$	2 (3925)
VIII	050	$E_4 (A_2 C_1 E_1) E_4$	13 (24778)
IX	046	$E_4 (A_2 C_2) E_4$	39 (67353)
X	047	$E_4 (A_2 C_2) D_1 E_3$	7 (17768)
XI	036	$E_4 (A_2 B_1 C_1) E_4$	10 (24908)
XII	037	$E_4 (A_2 B_1 C_1) D_1 E_3$	9 (26515)
XIII	030	$E_4 (A_2 B_2) D_1 E_3$	28 (75289)

*Explained in Chapter 14 of the Main Report on Rainfall & Cropping Patterns.

Rainfall Zone I—E_4 (C_4) E_4

4.2 The districts, taluks and cropping patters in the Zone are :—

Cropping pattern	*Taluk*	*District*
$Jk_4 C_4 Gn_4 Pu_4/W_4$	Barwani	Khargone
	Rajpur	,,
$Jk_4 M_4 Pu_4 C_4 Gn_4/W_4$	Manawar	Dhar

4.3 The zone occupying 4,211 sq km has a total population of 5.64 lakhs with an average density of 134 per sq km. The taluk areas vary from 675 to 2,226 sq km. The elevation varies from 150 to 900 masl.

4.4 In this Zone, forests occupy only 6 per cent of the area. Twenty per cent of land is not available for cultivation and permanent pastures account for 10 per cent. Fallow lands being negligible net sown area is quite high (61 per cent). Soils are medium black and there is very little irrigation.

4.5 This zone has the lowest rainfall in the State with an annual average of about 70 cm. in 40 rainy days. Barwani average is still lower, *i.e.*, 64 cm. June to September rainfall accounts for nearly 90 per cent of the total, the maximum being in July.

4.6 This Zone primarily grows jowar, groundnut, pulses (other than gram and tur), cotton and bajra. Some maize and wheat are also grown. The zone is small, and only a few taluks of the two districts come within its purview whereas majority of the taluks of the districts fall in other zones. Hence crop yields and livestock patterns for the district concerned are discussed under the relevant zones.

Rainfall Zone II— E_4 (B_1C_3) E_4

4.7 The districts, taluk and cropping patterns included in the zone are :—

Cropping patterns	*Taluks*	*District*
$Jk_3\ C_4\ B_4\ Pu_4/W_4$	Khargaon	Khargaon
	Kasrawad	,,
$Pu_3\ Jk_4\ B_5\ C_3$	Sendhwa	,,
$Jk_3\ C_4\ Pu_4/F_4$.	Bhikingaon	,,
$Jk_4\ C_4\ Gn_4\ Pu_4/W_4$	Maheshwar	,,
$C_3\ Jk_4\ Pu_4$	Barwaha	,,
$C_3\ Jk_4/Pu_4$	Burhanpur	Khandwa
$Jk_3\ C_4\ Pu_4/F_4$	Khandwa	,,

4.8 The population of the zone is 1.7 million with an area of 12,303 sq km. The average population density is 137 per sq km ranging between 94 and 213.

4.9 The elevations in general are between 200 and 600 masl. However, in Khargaon it is much higher the difference between the maximum and minimum elevations being about 700 masl.

4.10 Forests generally occupy 10-20 per cent of the total area. Land not available for cultivation, cultivable waste and permanent pastures account for 6-14, 1-6 and 10-19 per cent respectively. There is very little fallow land. The net sown area varies between 52 and 70 per cent, the zonal average being 66 per cent. The soil is medium black and irrigation is negligible.

4.11 Rainfall is moderate, the annual average being 85 cm. in 43 rainy days. July, as usual is the rainiest month and together with August accounts for 50-60 per cent of annual rainfall. All the four months from June to September get more than 10 cm. pm. of rainfall.

4.12 The cropping pattern of the Zone is $Jk_4\ C_4\ Pu_4$, though there are significant variations as among the various taluks (vide Paragraph 4.7). Jowar, pulses and cotton are the leading crops accounting for 29, 20 and 19 per cent respectively of the cropped area; followed by bajra and wheat which are cultivated over 7.5 and 5 per cent of the cropped area. In Sendhwa taluk, pulses, other than gram and tur, are cultivated over 32 per cent of the cropped area and jowar (kharif) over 25 per cent. The area under each of the other crops in this taluk is below 7 per cent (that under bajra being 7 per cent and jowar rabi and groundnut 6 per cent each). The cropping pattern for the taluk, therefore, is $Pu_3\ Jk_4\ B_5\ C_3$. Of the 7 patterns in this region, jowar (kharif) dominates in 4, cotton in 2 and pulses in 1. However, four patterns in which jowar (kharif) dominates and the two in which cotton is the main crop, differ from each other marginally.

4.13 The area under and yields of principal crops in this Zone are shown in Table 12. The yield of the principal crop in the zone (*viz.* jowar kharif) is about the same as the all-India average while that of the rabi jowar is well above the all-India average. The yield in the case of cotton compares favourably with that in the neighbouring areas of Maharashtra or the State average yield, although the crop is cultivated in the Zone under rainfed conditions. In case of other principal crops, namely, pulses and bajra, yields are about two-thirds of the all-India levels. Yields in the case of crops like wheat, maize and paddy are also significantly lower than the all-India level. Apart from jowar (kharif) the only crop whose yield is higher than all-India and area under crop is appreciable, is groundnut.

4.14 Male cattle and goats which are in almost equal numbers constitute half of the total livestock population in this, Zone, the livestock pattern being $Cm_4\ Cf_4\ Cy_4/G_4$.

TABLE 12

Area under and Yield of Crops in Zone II

Crop	Area ('000 ha)	Per cent of cropped area	RYI*
jowar (kharif)	189	29	102
cotton	120	19	86
total pulses	131	20	65
wheat	33	5·1	82
bajra	49	7·5	67
jowar (Rabi)	8	1·3	127
maize	26	4·5	61
paddy	14	2·1	40
tur	22	3·3	75
Groundnut	56	8·6	113

*Relative Yield Index represents Khargone district yield expressed as percentage of the corresponding all-India average yield for 1968-69 to 1970-71.

Rainfall Zone III— E_4 ($B_2C_1E_1$)

4.15 The districts, taluks and cropping patterns in the zone are given below :

Cropping pattern	*Taluks*	*District*
$W_3\ G_4\ Jk_4/Pd_4/C_4$	Gohad	Bhind
	Pichhore	Gwalior
	Bhander	,,
	Seondha	Datia
	Datia	,,
$W_3\ Jk_4\ G_4/C_4/F_4$	Sheopur	Morena
	Shivpuri	Shivpuri
$W_4\ Jk_4\ C_4\ F_4/G_4$	Gwalior	Gwalior
	Karera	Shivpuri
	Pohri	

Cropping pattern	*Taluks*	*District*
W_4 Jk_4 O_4 F_4 Mt_4 M_4/Pu_4	Pichhore	Shivpuri
Jk_3 W_4 F_4 /G_4 Pu_4	Kolaras	,,
	Bhanpura	Mandsaur
Jk_3 C_4 Gn_4	Susner	Shajapur
Jk_4 F_4 W_4 G_4 Pu_4	Jaora	Ratlam
Jk_3 F_4 C_4 W_4	Alot	,,
Jk_3 Pu_4 F_4 Gn_4/W_4	Monasa	Mandsaur
	Malhargarh	,,
	Mandsaur	,,
	Neemuch	,,
	Garoth	,,
Jk_3 F_4 Gn_4 M_5	Sitamau	,,
B_3 O_4 W_4/G_4	Sabalgarh	Morena
	Bijeypur	,,
F_4 W_4 M_4 Jk_4	Jawad	Mandsaur
G_4 W_4 O_4 B_4/Jk_4	Mehgaon	Bhind
	Lahar	,,
	Bhind	,,
	Morena	Morena
	Ambah	,,
	Joura	,,

4.16 This is a large zone with 31 taluks spread over 8 districts and occupies 47 thousand sq km. The individual taluks vary in areas from 600—3800 sq km.

4.17 Mandsaur is a plateau with elevations of 450 to 600 masl. The elevations in Bhind and Morena are only 150—200 masl. In the rest of the zone elevations range from 150 to 500 masl.

4.18 The zone has a population of 5 million with a density of 105 per sq km. There are only 2 taluks where population density exceeds 200, Bijaypur, the lowest populated with 29 persons per sq km, has 43 per cent area under forest and another 25 per cent is not available for cultivation. Only 11 per cent of the area is available for cultivation in this taluk.

4.19 Forests occupy 20-40 per cent area in the northern districts but are negligible in the rest of the zone, the zonal average being only 16 per cent. Land not available for cultivation varies from 10-30 per cent. In Morena, it is as high as 23 per cent, the average of the zone being 18 per cent only. Cultivable waste is 10-20 per cent in the northern parts and negligible elsewhere. Pasture area is not large being only 8 per cent. Fallow lands are negligible. The net sown area shows large variations over the taluks, from 10 to 80 per cent, the zonal average being 46 per cent.

4.20 The soils are mainly medium black, except for Bhind and eastern portions of Gwalior and Shivpuri, which have mixed red and black soils. In half the taluks, irrigation is less than 10 per cent and in other 12 between 10 and 20 per cent. There are only four taluks which have more than 20 per cent irrigation. These are Gwalior (42 per cent), Karera (30 per cent), Shivpuri (24 per cent) and Jawad (25 per cent). Fodder features in some of the taluks viz Gwalior, Shivpuri, Ratlam and Mandsaur.

4.21 The annual rainfall of the zone, varies between 60 and 80 cm in the northern districts and 80 and 95 cm elsewhere. The month of maximum rainfall is July except in a few taluks of Bhind where rainfall in August is slightly higher. July (35 per cent) and August (30 per cent) together account for 65 per cent and with the months of June to September 90 to 95 per cent of annual rainfall is accounted for. Rainfall during the period June to September is highly variable.

4.22 Major cereal crops of the zone are jowar (k) (20 per cent) and wheat (19 per cent). Bajra and maize have smaller areas, totalling 10 per cent. Pulses occupy 21 per cent area, out of which 14 per cent is under gram alone. Oilseeds occupy 12 per cent and fodder crops 6 per cent of the cropped area. Wheat is a major crop in the 12 taluks of Bhind, Morena, Datia, Gwalior and Shivpuri districts and is at the head of four cropping patterns. In eight of the taluks wheat occupies more than 30 per cent of cropped area and with two more crops out of jowar (k), gram, paddy, oilseeds and fodder exceeds 70 per cent. In four other taluks, wheat occupies 25 per cent of cropped area, the other crops forming the pattern being J K, O and F or G. Pichhore (Shivpuri district) has half a dozen crops each occupying 15 per cent or less of the cropped area. Six of these, in fact, form the cropping pattern of the area, viz W_4 Jk_4 O_4 F_4 Mt_4 M_4/Pu_4.

Kharif jowar occurs in half a dozen patterns, 5 with Jk_3 and one with Jk_4. More than 30 per cent of Mandsaur district is dominated by Jk. The other significant crops in the zone are Cotton, Gram, wheat, pulses, groundnut and fodder occupying 20 to 30 per cent of the cropped area in three taluks each of Bhind and Morena; the other significant crops being wheat, oilseeds, bajra and jowar (k).

4.23 Relative Yield Index (RYI) values for cereals, pulses, cotton and oilseeds are shown in Table 13 for all the eight districts even though only parts of some of these districts are included in the zone. It can be seen from Table 13 that jowar (k) yields are generally above the all-India average, but the yield of wheat is low, RYI varying from 52 to 77. The yields of bajra are good in some of the districts but maize yields are low. Barley yield is moderate and closer to the all-India yield average. Excepting in a few districts, yields of pulses are on the low side. Cotton yields are about two-thirds of the all-India level. Of the oilseeds listed, yield of linseed is good but those of the rest are low.

4.24 Goats are significantly larger in number than the rest of livestock in Mandsaur and Ratlam districts. Elsewhere, none of the livestock exceeds 22 per cent of the total, and their numbers do not vary a great deal. The zone has three livestock patterns—one with goats as the leading livestock and the other with cattle.

Pattern	*Districts*
G_4 Cm_4 Cf_4 Cy_4	Mandsaur Ratlam Shajapur Datia
Cm_3 Cf_3 Cy_4 G_4/Rf_3	Morena Shivpuri
Cm_4 Cf_4 Cy_4 G_4 Rf_3/Bv_3	Bhind Gwalior

TABLE 13

Relative Yield Index of Principal Crops in Rainfall Zone III

District	Pd	Jk	B	M	W	Ba	Mt	G	T	Pu	S	C	Linseed	Gn	Sesamum	Rapeseed & Mustard
Bhind	96	150	136	—	77	110	—	104	81	120	—	—	—	—	—	60
Morena	73	106	173	—	60	86	—	121	74	131	72	—	128	—	93	—
Gwalior	98	159	131	—	69	87	—	82	90	103	59	—	148	—	66	—
Shivpuri	76	74	105	68	60	93	68	84	—	91	45	—	131	90	114	66
Datia	—	85	—	—	52	95	—	62	70	77	—	—	—	—	—	—
Mandsaur	—	106	88	72	64	118	—	76	81	76	64	56	140	71	—	—
Ratlam	34	118	78	64	54	—	68	66	80	78	66	54	—	80	—	—
Shajapur	44	147	—	94	67	—	—	74	84	91	33	66	—	87	—	—

NOTES : 1. For crop symbols reference may be made to para 2.8
2. Relative Yield Index represents district yield expressed as percentage of the corresponding all-India average yield for 1968-69 to 1970-71.

Rainfall Zone IV— $E_4(B_2C_2)E_4$

4.25 The districts, taluks and cropping patterns included in the zone are given below :

Pattern	*Taluks*	*Districts*
W_3 Jk_4 G_4 F_4/Pu_4	Indore	Indore
	Depalpur	,,
	Sawar	,,
W_3 Jk_4 G_4 F_4/Pu_4	Badnagar	Ujjain
W_4 G_4 F_4 Pu_4 Jk_4/C_4	Ratlam	Ratlam
	Dhar	Dhar
	Badnawar	,,
M_3 Jk_4 Pd_4 Mt_4/C_4	Jhabua	Jhabua
	Thandla	,,
M_4 Jk_4 Mt_4 C_4 F_4	Sailana	Ratlam
Jk_3 W_4 F_4 C_4/G_4	Khacharod	Ujjain
	Mahidpur	,,
	Tarana	,,
Jk_4 Pu_4 M_4 Gn_4 C_4	Kukshi	Dhar
Jk_4 F_4 W_4 G_4 /C_4	Dewas	Dewas
	Ujjain	Ujjain
F_4 Jk_4 W_4 G_4	Mhow	Indore
C_4 Pu_4 W_4 Gn_4 F_4 G_4/Mt_4	Sardarpur	Dhar
	Petlawad	Jhabua
Mt_4 Pu_4 Jk_4 B_4/M_4	Alirajpur	,,
	Jobat	,,

4.26 A large portion of this zone is above 450 masl. The lowest is Jhabua district having an elevation of 300 masl, and the highest are Dhar and Mhow taluks with elevations of 800-900 masl. The population of the zone is 3.6 million with an average density of 140 per sq km. About a third of the taluks have a population density of below 100 and nine have between 100 and 150.

4.27 Nine per cent of the State forest area is located in this zone. Land not available for cultivation generally varies between 13 and 30 per cent and that occupied by permanent pastures and grazing between 8 and 20 per cent of the total area. Fallow lands are negligible. The average net sown area in 21 taluks is 62 per cent of the total area, out of which nearly half have about 70 per cent or higher net sown area. The soils are mainly medium black and there is very little irrigation.

4.28 The annual rainfall varies between 80 and 100 cm in 40 to 45 rainy days. July is the month of maximum rainfall and with August accounts for 50 to 60 per cent of the total.

4.29 The main cereal crops of the zone are wheat and jowar occupying nearly equal areas. These two crops together account for 35 per cent of the total cropped area. Wheat area is less than 10 per cent in Jhabua but 10 to 37 per cent in the other taluks of the zone. Jowar area exceeds 10 per cent except in a few taluks. Maize acreage is below 10 per cent in two-thirds of the taluks. Small millets predominate in Jhabua district. Gram and other pulses account for just about 10 per cent of the area. Zonal averages for cotton and fodder crops are 8-9 per cent, but they feature only in some of the taluks. Of the eleven cropping patterns of the zone three each start with wheat and jowar, two with maize and one each with cotton, fodder and millets.

4.30 Indore, Ujjain and Jhabua districts, most of Dhar district and small portions of Ratlam and Dewas are included in the zone. The relative yield index (RYI) of the main crops is shown in Table 14. The data indicate that Jowar (kharif) yields are good in Indore, Ujjain, Ratlam and Dewas but low in Jhabua and Dhar. Yields of other crops are low in all the districts of the zone, except those of pulses and groundnut in one or two districts.

4.31 Goats constitute nearly 25 per cent of the total livestock followed by male cattle (20 per cent), female cattle (17 per cent) and youngstock (18 per cent). Female buffaloes feature significantly in Indore and Dewas. The pattern for the Zone as also for Indore, Ujjain, Jhabua and Dhar, the four important districts of the Zone, G_4 Cm_4 Cf_4 Cy_4.

TABLE 14

Relative Yield Index of Principal Crops in Zone IV

	Indore	Ujjain	Dhar	Jhabua	Ratlam	Dewas
jowar (kharif)	125	142	62	86	118	155
bajra	—	89	71	58	78	—
wheat	82	71	73	65	54	63
maize	76	68	63	46	64	68
small millets	—	—	75	61	68	—
gram	81	80	70	70	66	92
tur	82	80	85	73	80	85
total pulses	97	91	79	67	78	106
groundnut	73	106	79	84	80	100
cotton	55	55	62	66	54	79
rice	—	—	43	34	34	43

NOTE : Relative Yield Index represents district yield expressed as percentage of the corresponding all-India average yield for 1968-69 to 1970-71.

Rainfall Zone V— F_4 (A_1 B_1 C_1 E_1) E_4

4.32 The districts, taluks and cropping patterns included in the Zone are given below :

Cropping Pattern	*Taluk*	*District*
Jk_3 C_4 G_4/W5	Shajapur	Shajapur
	Agar	,,
Jk_3 F_4 C_4 M_4/W_4 . . .	Rajgarh	Rajgarh
	Khilchipur	,,
	Sarangpur	,,
W_3 Jk_4 G_4 /F_4/O_4/C_5 . . .	Mungaoli	Guna

4.33 The area of the zone is 9,179 sq km and its population density varies from 70 to 125 per sq km the average being 99. The elevation of the zone ranges between 450 and 600 masl.

4.34 Forest area is negligible in taluk other than Mungaoli, which has about 20 per cent area under forests. With land not available for cultivation between 6 and 22 per cent, cultivable waste between 6 and 14 per cent, pasture lands generally between 15 and 20 per cent and negligible fallow lands, the net sown area in the different taluks varies between 45 and 73 per cent, the average for the zone being 55 per cent. The soils are medium black and there is very little irrigation worth mentioning.

4.35 The annual rainfall varies between 90 and 110 cm in 45 rainy days. July is the month of maximum rainfall, which together with August account for more than 60 per cent of total rainfall. The distribution of rainfall in this zone is fairly good.

4.36 Jowar, the dominant crop of the zone occupies one-third of the cropped area, followed by wheat and cotton with about 14 per cent each. Fodder crops occupy 8 per cent and groundnut 7 per cent of the cropped area. Individual pulse crops do not feature in the cropping pattern but collectively they occupy about 10 per cent of the cropped area. The total number of patterns is 3, two of them covering five taluks begin with jowar Mungaoli taluk pattern alone starts with wheat.

4.37 Rajgarh and Shajapur are the main districts in the zone. RYI of the principal crops in these districts are given in Table 15. It will be seen that only jowar and pulse yields are generally good while those of the other crops are low.

4.38 In Rajgarh and Shajapur districts, goats and cattle dominate and together account for more than 70 per cent of the livestock of this zone. The pattern of these two districts is the same, viz, G_4 Gm_4 Cf_4 Cy_4. One taluk of Guna district which is included in the zone has the pattern: Cm_4 Cf_4 Cy_4 G_4, showing the dominance of cattle over goats.

TABLE 15

Relative Yield Index of Principal Crops in Zone V

	Area ('000 ha)	Per cent of cropped area	RYI
jowar (kharif)			
Rajgarh	140	34	112
Shajapur	129	35	147
wheat			
Rajgarh	48	12	56
Shajapur	62	17	67
total pulses			
Rajgarh	38	9	100
Shajapur	45	12	91
groundnut			
Rajgarh	35	8	78
Shajapur	33	9	87
cotton			
Rajgarh	44	11	64
Shajapur	69	19	66
gram			
Rajgarh	19	5	86
Shajapur	20	6	74
tur			
Rajgarh	9		85
Shajapur	11		84

NOTE : Relative Yield Index (RYI) represents district yield expressed as percentage of the corresponding all-India average yield for 1968-69 to 1970-71.

Rainfall Zone VI —E_4 (A_1 B_1 C_2) E_4

4.39 The districts, taluks and theia cropping patterns included in the zone are given below :

Cropping Pattern	*Taluk*	*District*
Jk_3 C_4 F_4/Pu_4	Kannod	Dewas
Jk_3 Gn_4 T_4	Sausar	Chhindwara
Jk_4 Mt_4 W_4 O_4 G_4	Amarwara Chhindwara	,, ,,
Jk_4 W_4 Mt_4 Pu_4 G_4/T_4	Multai Bhainsdehi	Betul ,,
Jk_4 F_4 W_4 G_4/C_4	Bagli Sonkatch	Dewas ,,
Mt_3 W_4 G_4 Jk_4	Betul	Betul
W_3 Jk_4 $F_4/C_4/O_4/G_4$	Khatigaon Ashta	Dewas Sehore
W_3 O_4 C_4/Pu_4	Harda	Hoshanga-bad
C_4 Jk_4 Pd_4 Mt_4	Harsud	Khandwa

4.40 The area of the zone is 28,760 sq km with an average population density of 94 per sq km. All the thirteen taluks exceed 1,000 sq km in area, six of them being larger than 2,000 sq km.

4.41 The zone is a plateau but with large variations in elevation, from 300-450 to 1200-1350 masl.

4.42 Forest areas vary in different taluks and generally range from around 20 to 50 per cent, the zonal average being 22 per cent. The net sown area varies from 34 to 67 per cent, the average being 52 per cent. The rest of the area is accounted for by land not available for cultivation, permanent pasture and fallow lands. The soils are mainly medium black with patches of deep black and shallow black in Betul and Chhindwara. There is no irrigation worth mentioning.

4.43 The annual rainfall is over 100 cm with maximum in July, exceeding 30 cm June to September rainfall accounts for 90 per cent of the total annual rainfall. This Zone has got a moderately good distribution of rainfall, like Zone V.

4.44 Jowar (kharif) covers the largest area with 22 per cent of the total area followed by wheat (17 per cent) and small millets (12 per cent). These three crops together account for half of the cropped area of the zone. Cotton is significant in 5 taluks, areas occupied being 14 to 30 per cent of the cropped area. Small millets occupy more than 10 per cent area in five taluks and find a place in four cropping patterns. Of the nine cropping patterns in the zone, two begin with wheat, one each with small millets and cotton, and five with jowar. Two of the patterns beginning with jowar have five crops out of which four are common.

4.45 Table 16 gives the Relative Yield Index (RYI) values of the main crops in the districts of Chhindwara, Betul and Dewas. Jowar yield are generally good; yield in Dewas being one and a half times that of all-India. Excepting tur in Chhindwara and groundnut in Dewas, yields of all other crops are low.

4.46 Of the total livestock, cattle form 70 per cent in Chhindwara and Betul districts and 60 per cent in Dewas district. Goats constitute only 15 to 20 per cent of total livestock numbers. The livestock patterns are :

Chhindwara, Betul	Cm_4 Cf_4 Cy_4
Dewas	Cm_4 Cf_4 Cy_4 G_4

TABLE 16

Relative Yield Index of Principal Crops in Zone VI

	Chhindwara	Betul	Dewas
jowar (K)	122	92	155
wheat	48	56	63
small millets	54	50	—
gram	81	57	92
tur	130	82	85
cotton	70	65	79
groundnut	78	77	100
paddy	58	85	43

NOTE : Relative Yield Index represents district yield expressed as percentage of the corresponding all-India average yield for 1968-69 to 1970-71.

Rainfall Zone VII—E_4 ($A_1B_1C_2$) D_1 E_3

4.47 The district, taluks and cropping pattern included in the zone are given below :

Cropping Pattern	*Taluk*	*District*
Pd_3 Mt_4 Pu_4/G_4	Khairgarh Kawardha	Durg

This zone with only 2 taluks has an area of 3,925 sq km. The minimum elevation is 300 and the maximum 900 masl. The population of the zone is about 5 lakhs with a density of 131 per sq km. The net sown area is high (70 per cent), because forest area is negligible and the percentages of land not available for cultivation, permanent pastures and fallow lands are respectively 10, 7 and 6. The soils are medium black and the area under irrigation is less than 10 per cent of the cropped area.

4.48 Annual rainfall is over 110 cm in 65 rainy days. July is the month of maximum rainfall and together with August accounts for 50 per cent of the annual precipitation. Rainfall distribution is generally good with October getting more than 5 cm rainfall.

4.49 Paddy is the main crop with 31 per cent of the cropped area, followed by small millets (24 per cent), gram (6 per cent), tur (5 per cent) and other pulses (14 per cent). Oil seeds (other than groundnut) occupy 11 per cent of the cropped area. All these together account for over 90 per cent of the cropped area. The pattern dominated by paddy, small millets and pulses is Pd_3 Mt_4 Pu_4.

4.50 The RYI for paddy in Durg district which has 5.8 lakh ha under this crop in 1971-72 is only 76. The district has only one month of rainfall which exceeds 30 cm, the other two months having 20-30 cm rainfall. Supplemental irrigation in 25 per cent of the area is not enough, although it helps in increasing the yield.

4.51 In spite of good rainfall, small millets have very low yield (RYI-36). Yield of gram and other pulses are below the all-India level.

4.52 Cattle dominate among the livestock in this Zone and the pattern is Cy_3 Cm_4 Cf_4.

Rainfall Zone VIII—E_4 (A_2 C_1 E_1) E_4

4.53 The districts, taluks and their cropping patterns in the zone are given below :

Cropping Pattern	*Taluk*	*District*
W_3 Jk_4 G_4	Laundi	Chhatarpur
W_3 Pd_4 O_4/G_4	Panna	Panna
	Nagod	Satna
W_4 Mt_4 F_4 Jk_4/Pd_4	Tikamgarh	Tikamgarh
	Jatara	,,
	Niwari	,,
W_4 Mt_4 F_4 O_4 Ba_4	Chhatarpur	Chhatarpur
	Bijawar	,,
W_4 Pd_4 Mt_4 G_4/O_4	Sirmaur	Rewa
	Huzur	,,
Pd_3 Mt_4 W_4/O_4	Mauganj	,,
Pd_4 G_4 W_4 Jk_4 Ba_4	Teonthar	,,
G_4 W_4 O_4 Ba_4	Ajaigarh	Panna

4.54 The area of the zone is 25 thousadn sq km and has 13 taluks in 5 districts. The population is 2.7 million with an average density of 109 per sq km. All taluks but one (Rewa-Huzur) have population density varying from 100 to 223.

4.55 Except Rewa and Panna, the elevation ranges from 300 to 550 masl. In the former, the minimum is much lower, viz 150 masl.

4.56 Forests occupy appreciable areas (generally varying from 15-35 per cent) in Panna and Nagod and some other taluks of Rewa District. The net area sown is 44 per cent, the rest being not available for cultivation (10-20 per cent), under pastures (7 per cent) and fallow lands (7 per cent). Excepting Rewa soils which are red and yellow, the rest are mainly mixed red and black. Twenty to forty per cent area is irrigated in Tikamgarh district and in Chhatarpur and Bijawar taluks. Elsewhere, the extent of area irrigated is small.

4.57 The annual rainfall varies from 100 to 120 cm. July and August together getting more than 60 per cent of it.

4.58 Wheat is the major crop of the zone accounting for 25 per cent of the gross cropped area and is followed by small millets (14 per cent) and paddy (13 per cent). Area under paddy, however, exceeds 20 per cent in some of the taluks. Gram and other oil seeds each account for 11 per cent. Barley covers appreciable area in some of the taluks but the zonal average is only 5 per cent. Jowar (kharif) accounts for only 7 per cent of the gross cropped area on the average, exceeding 10 per cent in a few taluks only. Fodder crops and other pulses also feature in the cropping patterns of some of the taluks.

4.59 The zone has eight cropping patterns 5 beginning with wheat, two with paddy and one with gram.

4.60 The Zone includes Rewa, Tikamgarh, Chattarpur, most of Panna and a part of Satna districts. The Relative Yield Index for the principal crops is shown in Table 17.

4.61 Even though jowar yields are high, no pattern starts with jowar. Barley promises well in two of the districts and small millets in one. The rest of the crops have poor yields compared with all-India levels, that of rice being the lowest.

4.62 The distribution of livestock in the zone shows the preponderance of male cattle. In Rewa and Panna, cattle form 70 per cent of the total and in Tikamgarh and Chattarpur, goats are as important as male cattle. The patterns that emerge are :

Pattern	*District*
Cm_4 Cf_4 Cy_4	Rewa
	Panna
G_4 Cm_4 Cf_4 Cy_4	Tikamgarh
	Chhatarpur

TABLE 17

Relative Yield Index of Principal Crops in Zone VIII

	Rewa	Tikamgarh	Chattarpur	Panna
rice	37	36	35	38
jowar(kharif)	90	128	128	123
small millets	106	61	60	56
wheat	57	95	77	55
barley	57	105	104	80
gram	95	93	90	66
total pulses	98	81	95	82

NOTE : Relative Yield Index represents district yield expressed as percentage of the corresponding all-India average yield for 1968-69 to 1970-71.

Rainfall Zone IX—E_4 (A_2 C_2) E_4

4.63 This is the second biggest zone (67,353 sq km) and covers 15 per cent of the area of the State. It has the largest number of taluks (39), spread over a dozen central and western districts. The districts and taluks and their cropping patterns in the zone are given below :

Cropping Pattern	*Taluk*	*District*
W_2 $G_4/F_4/Pu_4/Jk_4$	Khurai	Sagar
	Sagar	,,
	Ghairatganj	Raisen
	Goharganj	,,
	Raisen	,,
	Vidisha	Vidisha
	Basoda	,,
	Kurwai	,,
W_3 F_4 Pu_4	Banda	Sagar
	Rehli	,,
W_3 Pd_4 G_4/O_4	Damoh	Damoh
W_3 Pu_4 G_4	Baraily	Raisen
	Silwani	,,
	Begamganj	,,
	Budni	Schore
W_3 Jk_4 $G_4/F_4/O_4$	Guna	Guna
	Ashoknagar	,,
	Shironj	Vidisha
	Lateri	,,
W_3 Jk_4 $F_4/C_4/G_4/O_4$	Huzur	Schore
	Schore	,,
	Jehbawar	,,
	Barasia	Schore
	Nasrullaganj	,,

Cropping Pattern	*Taluk*	*District*
$W_3 O_4 Pu_4 G_4$	Hatta	Damoh
$W_4 Pd_4 Mt_4 G_4/O_4$	Maihar	Satna
	Amarpatan	,,
	Raghurajnagar	,,
$Jk_3 W_4 F_4/G_4$	Raghogarh	Guna
	Chachaura	,,
	Bhaora	Rajgarh
	Narsinghgarh	,,
$W_3 Jk_4 F_4/C_4/G_4$	Sujalpur	Shajapur
$Pd_3 Mt_4 O_4$	Beohari	Shahdol
$Pd_3 W_4 G_4 Mt_4/O_4$	Pawai	Panna
	Murwara	Jabalpur
$Pu_4 W_4 G_4 Jk_4$	Udaipur	Raisen
$Mt_3 Pd_4 O_4$	Bandhugarh	Shahdol
$G_4 W_4 Pu_4 Jk_4$	Patan	Jabalpur

4.64 The areas of the taluks vary widely from 500 to over 3000 sq km. Though the elevation variations in most of the taluks exceed 100 metres, the lower elevations may be grouped under two levels, ie 450 and 300 masl. The maximum elevation in almost all the taluks does not exceeds 700 masl.

4.65 The population of the zone is 6.7 million and the majority of the taluks in this zone have population densities in the range of 51 to 100 per sq km. the rest being generally in the range of 101 to 150.

4.66 A number of taluks in the districts of Raisen, Sehore, Vidisha and Shahdol have 25 to 50 per cent area under forests and in the rest of the Zone forest area is generally 10 to 20 per cent. The zonal average is 19 per cent. Taking out the land not available for cultivation (10 per cent), pasture lands (9 per cent), and the small extent of fallow lands, average net sown area is about 51 per cent. Soils are mainly medium black except for Panna and Satna, which have mixed red and black soils. A belt of deep black soils covers Sehore and adjoining eastern area. There is very little irrigation.

4.67 The annual rainfall of the Zone varies between 10 and 140 cm in 55 rainy days. July is the month of maximum rainfall and together with August accounts for more than 60 per cent of the annual precipitation.

4.68 Thirteen of the fifteen cropping patterns of the Zone feature wheat, which covers 37 per cent of the cropped area. Jowar (kharif) and gram account for 11 to 12 per cent each, paddy and fodder crops for 7-8 per cent and other pulses and other oilseeds for 6 per cent each. Seven patterns begin with wheat, two each with jowar, one each with pulses, small millets and gram.

4.69 The taluks in this Zone are spread over a dozen districts. These include 4 full districts, half or more of 5 districts and less than half of 3 districts. In the discussion of RYI of crops given in Table 18, taluks belonging to the last mentioned 3 districts are left out. Barring jowar (kharif) and to some extent total pulses the RYI of other crops is much below the all-India averages. Even though the cropping pattern begin in a majority of taluks with wheat, ie wheat covers a larger area, the yield is very low. Rainfall is definitely not adequate for paddy because of which yields are very low.

4.70 Excepting Rajgarh and Shajapur which have a predominance of goats, all the other districts have high cattle population. The prevailing livestock patterns in the Zone are.

Pattern	*District*
$Cm_3 Cf_4 Cy_4$	Vidisha
	Raisen
$Cm_4 Cf_4 Cy_4$	Sagar
	Damoh
	Sehore
	Panna
	Jabalpur
$Cm_4 Cf_4 Cy_4 G_4$	Shahdol
	Guna
	Satna
$G_4 Cm_4 Cf_4 Cy_4$	Rajgarh
	Shajapur

TABLE 18

Relative Yield Index of Principal Crops in Zone IX

	Paddy	Jowar(K)	Small millets	Wheat	Gram	Total Pulses
Sagar	57	176	76	50	70	88
Raisen	45	153	—	57	83	99
Vidisha	—	93	—	53	76	93
Damoh	57	165	66	56	65	84
Sehore	47	105	—	54	86	103
Guna	46	81	—	43	58	76
Satna	33	124	63	52	64	80
Shahdol	49	100	65	39	50	53
Jabalpur	48	128	71	47	80	96

Note : Relative Yield Index represents district yield expressed as percentage of the corresponding all-India average yield for 1968-69 to 1970-71.

Rainfall Zone X—$E_4(A_2\ C_2)\ D_1E_3$

4.71 The districts, taluks and cropping patterns in the zone are given below :

Corpping pattern	*Taluk*	*District*
Pd_1	Janjgir	Bilaspur
	Bilaspur	,,
$Pd_2\ Mt_4/Pu_4$	Balod Bazar	Raipur
$Pd_3\ Mt_4\ Pu_4$	Baikunthpur	Surguja
	Mahendragarh	,,
$Pd_3\ Mt_4\ Pu_4/G_4$	Bemetra	Durg
	Mungaoli	Bilaspur

4.72 The area of the zone is 17,768 sq km. Baikunthpur is less than 1,000 sq km and all the rest are between 1,100 and 4,720 sq km the latter being the area of Bilaspur. The population of the zone is 2.9 million with an average density of 163 persons per sq km. The population density varies between 120 and 192 in the various taluks.

4.73 The elevations vary from one taluk to another from 250 to 1,100 masl.

4.74 Excepting Bilaspur, Baikunthpur and Mahendragarh taluks where forests occupy 20 to 40 per cent of the total area, the remaining taluks have very little forest area. The zonal average is 14 per cent. Taking into account land not available for cultivation (8 per cent), pastures (10 per cent) and fallow lands (5 per cent), the average net sown area of the zone is 62 per cent. In the taluks devoid of forests it is higher.

4.75 The annual rainfall varies between 120 and 150 cm in 65 to 70 rainy days. Rainfall during July and Auguts is more than 30 cm p.m.

4.76 This is predominantly a zone for paddy the area under paddy varying between 35 and 80 per cent of the cropped area. The zonal average is 56 per cent. Associated in the cropping patterns are other pulses and small millets. Other crops are not important. Since the Zone includes only a few taluks of four districts, discussion of the yields will be under relevant zones which cover major parts of these districts.

4.77 Cattle which constitute about 70 per cent of the total livestock dominate the livestock patterns which are as below :

Pattern	*District*
$Cy_4\ Cm_4\ Cf_4$	Bilaspur
	Durg
$Cm_4\ Cf_4\ Cy_4/G_4$	Surguja
	Raipur

Rainfall Zone XI—$E_4\ (A_2\ D_1\ C_1)E_4$

4.78 The districts, taluks and the cropping patterns in the zone are given below :

Corpping pattern	*Taluk*	*District*
$Pd_4\ Mt_4\ G_4\ O_4\ W_4$	Gopadbanao	Sidhi
$Pd_4\ W_4\ G_4/Mt_4/O_4$	Sehore	Jabalpur
$Mt_3\ Pd_4\ O_4/Ba_4$	Deosar	Sidhi
	Singrauli	,,
$W_3\ O_4\ C_4/Pu_4$	Seoni Malwa	Hoshangabad
$W_4\ G_4\ Pu_4\ O_4$	Sohagpur	,,
	Hoshangabad	,,
$W_4\ Mt_4\ Pd_4\ G_4\ O_4$	Jabalpur	Jabalpur
$Pu_4\ W_4\ G_4\ Jk_4$	Gadarwara	Narsimhpur
$G_4\ W_4\ Pu_4\ Jk_4$	Narsimhpur	,,

4.79 The area of this zone is 24,908 sq km. The minimum and maximum elevations are between 300 and 700 masl except in Narsingapur and Sohagpur where the maximum elevations are 1600 and 1300 masl respectively. The population is 3 million with a zonal average density of 120 per sq km. The popuation density at the taluk level varies widely from 52 in Deosar to 334 in Jabalpur.

4.80 The net sown area varies generally between 45 and 60 per cent among the taluks, the zonal average being 44 per cent. The average zonal percentages are 20 and 13 for forest area and for land not available for cultivation. Pastures and follow lands and cultivable wastes constitute 5-6 per cent each. In Narsimhpur, Hoshangabad and adjoining areas of Jabalpur, the soils are deep black. In Sidhi, they are red and yellow. Area under irrigation is negligible.

4.81 The average annual rainfall of the zone is about 130 cm. In July and August the rainfall is maximum, both the months getting more than 30 cm pm.

4.82 This zone has diverse cropping patterns. Of the eight patterns, 3 being with wheat, 2 with paddy, one each with small millets, gram and other pulses. In the zonal avrages wheat occupies the largest area, viz, 21 per cent, followed by paddy, small millets and gram each 14-15 per cent and other pulses and oilseeds 9-10 per cent.

4.83 The Relative Yield Index of the various crops is given in Table 19. The yields of paddy, small millets, gram, barley and maize are low. Jowar yields are well above all-India levels and the zonal yield is also high. In the case of total pulses, zonal yields equal the all-India levels.

4.84 Cattle constitute nearly 70 per cent of the total livestock numbers in all taluks except Sidhi. The livestock patterns are :

$Cm_4\ Cf_4\ Cy_4$	Jabalpur
	Hoshangabad
$Cm_4\ Cf_4\ Cy_4\ G_4$	Sidhi
$Cy_4\ Cm_4\ Cf_4$	Narsimhpur

TABLE 19

Relative Yield Index of Principal Crops in Zone XI

District	Paddy	Jowar (R)	Small millets	Wheat	Gram	Total pulses	Barley	Maize
Jabalpur	48	128	71	47	80	96	-	77
Hoshangabad	85	145	60	46	55	90	--	98
Sidhi	34	112	63	49	67	85	87	74
Narasimpur	87	154	66	74	77	104	---	---

NOTE : Relative Yield Index represents district yield expressed as percentage of the corresponding all-India average yield for 1968-69 to 1970-71.

Rainfall Zone XII—E_4 (A_2 B_1 C_1) D_1E_3

4.85 The districts, taluks and the cropping patterns included in the zone are given below :

Cropping Pattern	*Taluk*	*District*
Pd_2 Mt_4	Sohagpur	Shahdol
Pd_2 Pu_4/Mt_4	Baihar	Balaghat
Pd_3 Mt_4 Pu_4	Bharatpur	Surguja
Pd_3 Mt_4 Pu_4 W_4	Mandla Seoni	Mandla Seoni
Mt_3 Pd_4 O_4	Pushparajgarh Niwas Dindori	Shahdol Mandla ,,
W_4 Mt_4 Pd_4 G_4 O_3	Lakhnadan	Seoni

4.86 The area of the zone is 26,515 sq km. It has nine taluks in five of the eastern districts. Excepting one the others exceed 2000 sq km and four of them are more than 3000 sq km. Sohagpur taluk has an area of 5039 sq km, the highest in the State.

4.87 While the minimum elevation in Balaghat, Surguja and Shahdol areas is 300 masl elsewhere it is 450. The maximum elevations vary considerably, exceeding 1,000 masl in Bharatpur, Pushprajgarh and Sohagpur.

4.88 The total population of the zone is 2.4 million with an average density of 92 per sq km. Bharatpur in Surguja district has a very low average of 16 per sq km because 60 per cent area is occupied by forests and a considerable area is not available for cultivation. The population densities for the other taluks vary between 62 and 120.

4.89 Forests occupy 30 to 66 per cent of the area in Sohagpur, Baihar and Bharatpur taluks, 11 per cent of the land in the Zone is not available for cultivation and another 11 per cent is fallow. The net area sown is 46 per cent. While Seoni, Balaghat and Western parts of Mandla have shallow black soils, those soils in the rest of the zone are red and yellow with medium black in the north-west and western half of Mandla and Shahdol districts. There is very little irrigation in the zone.

4.90 Heavy rainfall ranging between 130 and 170 cm in 70-80 rainy days is characteristic of the Zone. July is the month of maximum rainfall and with August, it accounts for 55-65 per cent of annual precipitation.

4.91 Paddy (30 per cent) and small millets (24 per cent) are the main crops of the zone, covering more than half of the total cropped area. These two crops dominate the cropping patterns. Wheat is predominant in one taluk only. The zone has five cropping patterns, three of which begin with paddy and one each with wheat and small millets.

4.92 The Relative Yield Index values of important crops are given in Table 20. The yields of most of the crops are low, including those of small millets and even the dominant crop, paddy.

4.93 Cattle dominate the livestock patterns of the zone with a total of about 70 per cent. In some of the districts, goats are more than 10 per cent of total. There is thus only one common pattern for the zone, viz, Cm_1 $Cf_4/Cy_4/C_1$.

TABLE 20

Relative Yield Index of Principal Crops in Zone XII

District	Paddy	Maize	Small millets	Wheat	Total pulses
Balaghat	94	88	80	32	78
Surguja	61	97	75	53	65
Seoni	106	81	66	33	81
Mandla	56	106	58	59	74
Shahdol	49	49	65	39	53

NOTE : Relative Yield Index represents district yield expressed as percentage of the corresponding all-India average yield for 1968-69 to 1970-71.

Rainfall Zone XIII—E_4 (A_2 B_2) D_1 E_3

4.94 The districts, taluks and the cropping patterns included in the zone are given below :

Cropping pattern	*Taluk*	*District*
Pd_4	Raigarh	Raigarh
	Sarangarh	,,
	Sakti	Bilaspur
	Katghora	,,
	Mahasamund	Raipur
	Bindranasagarh	,,
	Bijapur	Bastar
Pd_2 Mt_4/Pu_4	Surajpur	Surguja
	Ambikapur	,,
	Jaspur	Raigarh
	Udaipur	,,
	Gharghoda	,,
	Balaghat	Balaghat
	Wara-Seoni	,,
	Raipur	Raipur
	Dhamtari	,,
	Durg	Durg
	Sanjanbalod	,,
	Kankar	Bastar
	Bhanupratappur	,,
	Narayanpur	,,
	Jagdalpur	,,
	Konta	,,
	Kondagaon	,,
Pd_3 Mt_4 O_4	Samri	Surguja
Pd_3 Mt_4 Pu_4/G_4	Rajnandgaon	Durg
Pd_3 Mt_3	Dantewara	Bastar
Mt_3 Pd_4 O_4	Pal	Surguja

4.95 This is the largest of the rainfall zones with an area of 75,289 sq km, which is a little over 17 per cent of the area of the State. The number of taluks is 28 which span seven districts. The entire districts of Raigarh, Bastar, Balaghat and Raipur (but for one taluk) and about half the taluks of Bilaspur, Surguja and Durg districts are included in the zone. The total population of the zone is nine million with an average population density of 119 persons per sq km. The taluk population densities vary between 32 in Bijapur and 263 in Raipur.

4.96 The minimum and maximum elevations in the taluks vary considerably from 300 or less to over 1,000 masl. In Durg the range is 300 to 600 masl; the maximum being over 900 masl in Raipur, Balaghat and Bilaspur areas and to 1,050 masl, in Raigarh. Surguja and Bastar have maximum elevations of over 12,000 masl.

4.97 Forests occupy large areas of some of the districts. The percentages in each district are Bastar (66), Surguja (55) Balaghat (55), Raipur (38), Bilaspur (40), Durg (26) and Raigarh (32). In fact, about half of the area of Zone is under forests. Considering that another 10 per cent area is not available for cultivation; 10 per cent is under permanent pastures, and about 5 per cent under fallow lands, the net sown area comes to 44 per cent for the Zone, varying from 30 in three taluks of Bijapur, Pal and Narainpur to 75 per cent in Sakti. Bastar and the south-western parts of Durg district have red sandy soils. Balaghat soils are black, deep in the northeast and shallow elsewhere. Red and Yellow soils with patches of deep black soils are present in the rest of the zone. Raipur, Durg, Balaghat and Bilaspur districts have each more than a lakh hectares under irrigation, but elsewhere irrigated area is negligible. Rainfall is heaviest in this zone with annual averages of 150 to 170 cm, 85 to 90 per cent of annual rainfall occuring in the months June to September. July gets about 30 per cnt of annual rainfall and August rainfall is slightly lower. June and September contribute only 15 per cent to the total rainfall.

4.98 The Zone is dominated by paddy, which covers 60 per cent of the cropped area. Other pulses cover 15 per cent area and small millets 11 per cent. Other crops are cultivated only to a negligible extent. The zonal cropping pattern is Pd_2 Pu_4/Mt_4. There are, however, variations in the cropping patterns in the various taluks.

4.99 RYI values of the main crops of the zone are given in Table 21.

4.100 Rice, the major crop of the zone, has yields lower than all-India levels and in many of the districts the RYI is below 75. The yield of small millets is even lower than that of paddy. In Raigarh and Durg the RYI is only around 36. Maize yields are closer to all-India but maize does not feature in the cropping patterns of the Zone. Pulse yields are also lower than the all India levels.

4.101 Cattle constitute the main livestock population of the zone, being 60 to 72 per cent of the total and accordingly the livestock pattern is Cy_4 Cm_4 Cf_4. Excepting Bilaspur, goats feature in the various livestock patterns in the Zone.

Pattern	*District*
Cy_4 Cf_4 Cm_4	Bilaspur
	Durg
	Raipur
Cm_4 Cf_4 Cy_4/G_4	Surguja
	Balaghat
Cm_3 Cf_3 Cy_4 G_4	Raigarh
	Bastar

TABLE 21

Relative Yield Index of Principal Crops in Zone XIII

	Paddy	Small millets	Gram	Total pulses	Wheat	Maize
Raigarh	74	37	55	57	53	111
Bilaspur	74	77	72	69	54	102
Bastar	70	45	52	66	55	105
Surguja	61	75	46	65	53	97
Balaghat	94	80	79	78	32	88
Raipur	76	60	74	82	47	90
Durg	96	36	62	55	41	—

NOTE : Relative Yield Index represents district yield expressed as percentage of the corresponding all-India average yield for 1968-69 to 1970-71.

5 FUTURE CROPPING PATTERNS—SOME OBSERVATIONS

General

5.1 The foregoing sections have dealt with in detail the rainfall, cropping and livestock patterns which emerge from the existing information. The rainfall patterns have been grouped into Zones and it has been examined how the cropping and livestock patterns featur in these Zones. Among other information that on soils, which ought to play an important role in determining cropping patterns, is lacking in such detail as is rquired for this analysis. Data on orography and population density have featured in this analysis but their exact role in the cropping and livestock patterns could not be brought out owing to lack of detailed information. It is, however, considered that studies and analysis indicated in the preceding sections are important for the guidance they may give in deciding cropping and livestock patterns vis a vis rainfall patterns. The greater the accuracy of the primary information and the more detailed such information is, the more useful the data would be in indicating the most efficient cropping and livestock patterns in an area or a zone. With this purpose in view the following procedures are suggested :

(i) Delineation of rainfall zones;

(ii) Identification of the existing cropping patterns;

(iii) Assessment of area needed for each crop and its ideal distribution.

(iv) Comparison of (iii) with (ii) in order to determine possible changes; and

(v) Consideration of other related factors like soil, irrigation facilities, density of population, livestock patterns and then arriving at the future cropping patterns.

5.2 The methods of delineating rainfall patterns or zones and cropping patterns have been fully discussed in Section 2. For the purpose of locating suitable areas for a crop, soil and topography of the land are important factors. The approximate area to be put under each crop will be decided by the demand for it at the State and national levels both for internal consumption and export. The departments responsible for crop planning of a State should, therefore, be cognisant of the demand for a crop, so that production efforts are not rendered futile because of lack of demand and marketing. The part each of the factors mentioned in item v) of para 5.1 is likely to play in deciding cropping patterns has already been discussed. For this purpose not only detailed data but also knowledge about the correlation between these factors and crop performance would be necessary. Knowledge gained, through long experience, by farmers would also be most helpful.

5.3 It may be mentioned that the rainfall intervals which form the basis of identifying rainfall patterns are subject to minor modifications. Thus, the condition that not less than 30 cm of rainfall for three consecutive months is good for paddy may not be rigorously adhered to. If the soil is favourable and has a high water retention capacity or, what is more important, water management is efficient with an eye on economic water use, rainfall lower than 30 cm for three months may sustain a good crop of paddy.

5.4 The choice of a cropping pattern is not decided by the farmer only on technical grounds. He is also guided by the profitability of the crops or requirements for his household consumption. Farmers may not be inclined to accept a crop unless the necessary inputs and infrastructure are assured. Of all the inputs water is the most important as is made evident by the spread of groundnut in the country, sugarcane in Gujarat, maize and cotton in Karnataka and recently of wheat in West Bengal. These are excellent insatnces of the manner of introduction of new crops in the cropping patterns of a State or a region.

Some Observations pertaining to Madhya Pradesh

5.5 The importance of Madhya Pradesh to crop production will be apparent from the fact that it is one of the three States which together account for about 38 per cent of the gross cropped area of the country, the share of Madhya Pradesh being 12 per cent, of Uttar Pradesh 14 per cent and of Maharashtra 12 per cent. The rainfall pattern in the southwest monsoon period is A_2 B_2 over vast areas of the State which augurs well for crop production. The present yields of most of the crops grown in the State are below the all-India averages. The reasons for low yields merit close study.

5.6 The rainfall patterns of the various zones show that only two months of July and August have A type rainfall and June and September have B type rainfall. Because of the A type rainfall, farmers are tempted to grow paddy, but the subsequent rainfall is not enough to carry the crop to maturity. Perhaps more economic and efficient water management may help in some of the zones. On the other hand, A_2 B_2 type rainfall proves to be too much for many other crops. The undulating terrain aggravates the problem by causing waterlogging in low lying areas and insufficiency of soil moisture in high lying areas. Better water management is one important aspect deserving special attention.

5.7 Paddy crop has in any case, to be confined to low lying areas or where supply of water could be ensured during the entire life span of the crop. If this is done, the yield of rice may improve if suitably supported by better technology.

5.8 With the improvement of damage many other crops like maize, cotton, soybean, *urad*, which have high water requirements, though lower than paddy, could be probably taken in areas from where rice is withdrawn. With better cultural practices, yields of other crops like sesamum, bajra and pulses might also improve.

In this context *haveli* lands and wheat fallows need special mention. In both these kinds of lands, the

emphasis is to raise rabi crops, particularly wheat, without taking any crop during the kharif season. In *haveli* type of cultivation, water is suitably impounded and made to stand in the field until September, whereafter it is allowed to evaporate away or drain of by the end of October. Then the fields are prepared for rabi sowings. Where no crop is taken during kharif season in *haveli* lands it may be that either water is inadequate for paddy or too much for other crop. The experiments being carried out at J N K Vishwavidyalaya, Jabalpur to utilise the water which is at present wasted in the kharif season for crop production are in the right direction.

5.9 Irrigation facilities becoming available, wheat should be taken in areas of assured irrigation. *Haveli* lands in that case need not be used for wheat but other useful kharif crops may be taken instead followed by suitable rabi crops where possible. When a part of the wheat area comes under full irrigation, it should be possible to allocate some lands to sunflower or safflower in the rabi season. With increased irrigation facilities it should be possible to increase the area under sugarcane crop.

5.10 Considerable area in the State is put under *Khesari* pulse (*Lathyrus sp.*) as relay crop in *paddy* lands. Owing to the danger of lathyrism caused by the pulse, either precautionary measures should be taken or toxin free varieties popularized. With improved techniques and better yielding varieties becoming available, it should be possible to maintain the present level of production of this crop even with smaller area. The surplus area may be diverted to safflower.

5.11 A substantial area of the State is under small millets. Small millets are rich in minerals but are hard to digest. At present, small millets are the main stay in hilly regions. Their preference stems from the fact that they are hardy and could be grown in marginal and sub-marginal lands without requiring much care. Future researches on small millets are likely to result in the favour of high yielding varieties as it has happened in the case of cereals, and the present production may be maintained on about half the present area. For better nutrition and economy, it is advisable to take to mixed farming. In view of this it may be advisable to divert half the existing area under small millets to fodder crops. Many small millets could also be used for fodder.

5.12 The area under fruit crops like citrus and banana can also be increased with advantage in this State. The citrus group of crops suffer seriously from the dieback disease. We suggest rejuvenation of many of the existing orchards and replantation of some others. This will have to be suitably considered while formulating the future cropping patterns. Sapota (*Chiku*) and *ber* are some of the other orchard crops which require encouragement in the drier areas of the State.

सत्यमेव जयते

APPENDIX 1

Talukwise Land Use (1969-70) and Population Statistics

MADHYA PRADESH

(thousand hectares)

District/taluk	Population 1971		Forests	Nac	Cw	Pp&gl	Mtc&g	Fallow lands	Net area sown
	Total	Per sq km							
	Rainfall Zone—I						*Rainfall Pattern—$E_4(C_4)$ E_4*		
Khargone (West Nimar)									
Barwani	132981	197	-- (—)	15 (22·3)	1 (2)	5 (7)	—	1 (2)	45 (67)
Rajpur	173195	132	5 (4)	25 (19)	4 (3)	13 (10)	—	1 (1)	81 (62)
Dhar									
Manawar	258312	116	19 (9)	41 (18)	5 (2)	25 (11)	--	3 (1)	131 (59)
	Rainfall Zone—II						*Rainfall Pattern—E_4 (B_1 C_3) E_4*		
Khargon (West Nimar)									
Khargaon	265282	145	6 (3)	18 (10)	11 (6)	18 (10)	—	2 (1)	129 (70)
Kasrawad	95530	94	14 (14)	11 (11)	5 (5)	13 (13)		1 (1)	58 (57)
Sendhwa	209919	157	18 (13)	12 (9)	4 (3)	5 (4)	—	1 (1)	93 (70)
Bhikingaon	157861	99	22 (14)	10 (6)	10 (6)	18 (11)	---	2 (1)	98 (62)
Maheshwar	98875	123	13 (17)	7 (8)	2 (3)	15 (19)	--	1 (1)	42 (52)
Barwaha	151169	125	24 (20)	8 (7)	5 (4)	12 (10)	—	1 (1)	70 (58)
Khandwa (E. Nimar)									
Burhanpur	311188	213	4 (2)	20 (14)	1 (1)	16 (11)	2 (1)	3 (2)	101 (69)
Khandwa	399107	131	12 (4)	26 (9)	3 (1)	41 (13)	2 (1)	6 (2)	216 (70)
	Rainfall Zone—III						*Rainfall Pattern—E_4 (B_2 C_1 E_1) E_4*		
Bhind									
Gohad	150598	146	1 (1)	10 (10)	2 (2)	7 (7)	---	1 (1)	82 (79)
Gwalior									
Pichhore	219396	117	11 (6)	28 (15)	13 (7)	12 (6)	---	7 (4)	116 (62)
Bhander	82281	126	---	6 (8)	2 (3)	4 (6)	--	1 (1)	53 (82)
Datia									
Seondha	108356	117	11 (12)	8 (9)	7 (8)	Neg (1)	---	1 (1)	64 (69)
Datia	146911	132	8 (7)	16 (14)	11 (10)	7 (6)	2 (2)	5 (4)	63 (57)
Morena									
Sheopur	158782	42	150 (40)	56 (15)	43 (12)	23 (6)	--	7 (2)	96 (25)
Shivpuri									
Shivpuri	124168	63	79 (40)	35 (18)	26 (13)	11 (6)	---	3 (2)	41 (21)

— =nil or negligible (less than 500 hectares or 0·5 per cent)
Nac =not available for cultivation
Cw =culturable waste
Pp&gl =permanent pastures and other grazing lands
Mtc&g =miscellaneous tree crops and groves not included in net area sown

NOTES : 1. Figures in brackets represent percentages to total reporting area.
2. The percentage figures have been rounded off individually and hence cross totals may not, in some cases, add up to 100.

APPENDIX 1—(*Contd.*)

District/taluk	Population 1971		Forests	Nac	Cw	Pp&gl	Mtc&g	Fallow lands	Net sown area
	Total	Per sq. km							
	Rainfall Zone—III (Contd.)					*Rainfall Pattern—E_4 (B_2 C_1 E_1) E_4*			
Gwalior									
Gwalior	556328	207	99 (37)	59 (22)	18 (7)	14 (5)	—	6 (2)	73 (27)
Shivpuri									
Karera	165687	84	21 (10)	37 (19)	35 (18)	17 (9)	—	17 (8)	70 (36)
Pohri	87162	55	12 (7)	17 (11)	34 (22)	15 (10)	24 (15)	2 (1)	54 (34)
Pichhore	166536	70	31 (13)	45 (19)	34 (14)	28 (12)	—	26 (11)	75 (31)
Mandsaur									
Bhanpura	65613	63	33 (32)	25 (24)	4 (4)	4 (4)	—	Neg (Neg)	37 (36)
Shajapur									
Susner	123976	97	2 (2)	27 (21)	12 (10)	18 (14)	—	1 (1)	66 (52)
Ratlam									
Jaora	180112	132	—	11 (8)	14 (10)	12 (9)	—	1 (1)	97 (72)
Alot	102659	109	1 (1)	8 (9)	5 (5)	17 (18)	—	1 (1)	63 (66)
Shivpuri									
Kolaras	133014	58	52 (22)	29 (13)	21 (9)	18 (8)	9 (4)	3 (1)	98 (43)
Mandsaur									
Manasa	124813	82	37 (24)	41 (27)	4 (3)	8 (5)	—	Neg	62 (41)
Malhargarh	95577	119	—	12 (15)	4 (5)	6 (8)	—	Neg (1)	58 (71)
Mandsaur	195907	155	0·4 (0·4)	15 (12)	4 (4)	16 (12)	—	1 (1)	90 (71)
Neemuch	132981	155	3 (3)	13 (15)	4 (5)	8 (9)	—	Neg (1)	57 (67)
Garoth	109980	97	1 (1)	27 (24)	7 (6)	9 (8)	—	1 (1)	69 (61)
Sitamau	126242	99	1 (1)	21 (16)	6 (5)	18 (14)	—	1 (1)	80 (63)
Morena									
Joura	174750	110	22 (14)	50 (31)	11 (7)	9 (6)	—	1 (1)	66 (41)
Sabalgarh	155807	120	22 (17)	41 (31)	4 (3)	11 (8)	—	1 (1)	51 (39)
Bijeypur	84206	29	124 (43)	74 (25)	40 (14)	16 (6)	—	3 (1)	32 (11)
Mandsaur									
Jawad	110409	70	29 (18)	51 (33)	15 (9)	13 (9)	—	1 (1)	47 (30)
Bhind									
Mehgaon	164318	170	—	11 (11)	2 (2)	6 (6)	—	1 (1)	77 (80)
Lahar	191667	117	—	14 (13)	2 (2)	7 (7)	Neg (Neg)	1 (1)	83 (77)
Bhind	287372	209	6 (4)	25 (18)	1 (1)	10 (7)	—	1 (1)	94 (69)
Morena									
Morena	206290	193	6 (6)	22 (20)	3 (3)	7 (7)	—	1 (1)	68 (63)
Ambah	205503	194	—	24 (22)	1 (1)	7 (7)	—	1 (1)	73 (69)

APPENDIX 1 (*Contd.*)

District/taluk	Population 1971		Forests	Nac	Cw	Pp&gl	Mtc&g	Fallow lands	Net area sown
	Total	Per sq km							
	Rainfall Zone—IV		..	..	..	..	*Rainfall Pattern—E_4 (B_2 C_2) E_4*		
Indore									
Indore	682531	718	4 (4)	13 (14)	2 (2)	9 (10)	—	1 (1)	66 (69)
Depalpur	105096	103	Neg (Neg)	6 (6)	2 (2)	12 (12)	—	Neg (Neg)	81 (79)
Sawer	86135	113	—	4 (6)	2 (3)	7 (9)	—	Neg (1)	62 (81)
Ujjain									
Badnagar	125449	102	—	8 (6)	4 (3)	12 (10)	—	1 (1)	98 (80)
Ratlam									
Ratlam	245844	185	6 (4)	16 (12)	10 (8)	12 (9)	—	2 (1)	87 (66)
Dhar									
Dhar	179562	94	33 (17)	14 (7)	7 (4)	21 (11)	—	1 (1)	114 (60)
Badnawar	98538	93	2 (2)	8 (7)	3 (3)	17 (16)	—	1 (1)	75 (71)
Jhabua									
Jhabua	167325	116	28 (19)	18 (12)	5 (4)	13 (9)	—	4 (3)	76 (53)
Thandla	120508	115	31 (29)	11 (11)	5 (5)	10 (9)	—	1 (1)	47 (45)
Ratlam									
Sailana	97919	80	26 (21)	18 (15)	16 (13)	12 (10)	—	3 (2)	47 (39)
Ujjain									
Khacharod	169399	132	—	12 (10)	6 (4)	18 (14)	—	1 (1)	91 (71)
Mahidpur	112783	100	—	6 (5)	4 (3)	19 (17)	—	1 (1)	84 (74)
Tarana	119337	115	4 (4)	4 (4)	3 (3)	17 (16)	—	1 (1)	75 (72)
Dhar									
Kukshi	193854	113	19 (11)	27 (16)	6 (3)	25 (15)	—	3 (2)	91 (53)
Dewas									
Dewas	160609	160	1 (1)	8 (8)	2 (2)	13 (13)	—	1 (1)	77 (76)
Ujjain									
Ujjain	335548	241	—	15 (11)	7 (5)	11 (8)	—	2 (1)	105 (75)
Indore									
Mhow	151388	188	19 (23)	5 (7)	1 (1)	10 (12)	—	1 (1)	45 (56)
Dhar									
Sardarpur	112134	87	2 (2)	30 (23)	8 (6)	13 (10)	—	2 (1)	74 (58)
Jhabua									
Petlawad	86853	91	3 (3)	31 (32)	3 (4)	9 (9)	—	1 (1)	48 (51)
Alirajpur	170160	76	36 (16)	67 (30)	3 (1)	20 (9)	—	8 (3)	92 (41)
Jobat	122936	112	15 (14)	11 (10)	3 (3)	9 (8)	—	4 (3)	69 (62)
	Rainfall Zone—V		.. ..	..	.. ..	*Rainfall Pattern—E_4 ($A_1B_1C1E_1$) E_4*			
Shajapur									
Shajapur	225102	124	—	29 (16)	11 (6)	36 (20)	—	2 (1)	102 (56)
Agar	134554	93	1 (Neg)	32 (22)	11 (7)	30 (21)	—	2 (1)	71 (49)
Rajgarh									
Rajgarh	99316	92	1 (1)	8 (8)	14 (13)	22 (21)	—	3 (3)	59 (54)
Khilchipur	171178	105	2 (1)	27 (16)	9 (5)	25 (15)	—	2 (1)	100 (61)
Sarangpur	112214	124	—	6 (7)	5 (5)	12 (14)	—	1 (1)	66 (73)
Guna									
Mungaoli	163142	71	43 (19)	32 (14)	32 (14)	14 (6)	—	5 (2)	104 (45)

APPENDIX 1 (*Contd.*)

District/taluk	Population 1971		Forests	Nac	Cw	Pp&gl	Mtc&g	Fallow lands	Net area sown
	Total	Per sq km							
	Rainfall Zone—VI					*Rainfall Pattern—E_4 (A_1 B_1 C_2) E_4*			
Dewas									
Kannod	94545	67	52 (37)	5 (4)	1 (1)	19 (14)	—	2 (1)	61 (43)
Chhindwara									
Sausar	255066	129	26 (13)	2 (13)	5 (2)	10 (5)	Neg (Neg)	5 (3)	126 (64)
Chhindwara	515365	115	145 (32)	39 (9)	15 (3)	20 (5)	1 (Neg)	31 (7)	197 (44)
Amarwara	218982	60	111 (30)	29 (8)	19 (5)	24 (6)	Neg (Neg)	30 (8)	155 (42)
Betul									
Multai	287225	123	12 (5)	23 (10)	22 (9)	7 (3)	—	14 (6)	156 (67)
Bhainshdehi	176834	77	61 (26)	20 (9)	10 (4)	7 (3)	—	13 (6)	119 (52)
Dewas									
Bagli	118041	61	95 (49)	8 (4)	4 (2)	18 (10)	—	1 (1)	66 (34)
Sonkatch	145061	113	7 (5)	16 (12)	2 (2)	19 (15)	—	1 (1)	84 [(65)
Betul									
Betul	272137	113	42 (18)	25 (10)	19 (8)	9 (4)	—	25 (10)	121 (50)
Dewas									
Khatigaon	76080	69	21 (19)	8 (7)	4 (4)	20 (18)	—	2 (2)	55 (50)
Sehore									
Ashta	145990	100	26 (18)	9 (7)	3 (2)	18 (11)	—	0·4 (0·3)	90 (62)
Hoshangabad									
Harda	240435	95	27 (11)	18 (7)	9 (4)	34 (13)	Neg (Neg)	5 (2)	159 (63)
Khandwa									
Harsud	169036	91	14 (7)	13 (7)	1 (1)	43 (23)	1 (Neg)	5 (3)	109 (59)
	Rainfall Zone—VII					*Rainfall Pattern—E_4 (A_1 B_1 C_2) D_1 C_3*			
Durg									
Khairagarh	287699	126	15 (7)	25 (11)	5 (2)	16 (7)	—	14 (6)	153 (67)
Kawardha	225587	137	3 (2)	15 (9)	2 (1)	13 (8)	—	9 (6)	122 (74)
	Rainfall Zone—VIII					*Rainfall Pattern—E_4 (A_2 C_1 E_1) E_4*			
Chhatarpur									
Laundi	169083	96	4 (3)	16 (9)	32 (18)	13 (7)	—	8 (5)	103 (58)
Panna									
Panna	196946	70	98 (35)	39 (14)	35 (12)	2 (1)	Neg (Neg)	18 (6)	89 (32)
Satna									
Nagod	178707	98	59 (32)	21 (12)	14 (8)	7 (4)	1 (Neg)	8 (4)	73 (40)
Tikamgarh									
Tikamgarh	211935	124	7 (4)	24 (14)	23 (13)	27 (16)	—	12 (7)	78 (46)
Jatara	199253	115	12 (7)	26 (15)	19 (11)	26 (15)	—	6 (4)	84 (48)
Niwari	157697	135	6 (5)	21 (18)	9 (8)	23 (20)	—	5 (5)	52 (44)
Chhatarpur									
Chhatarpur	345255	103	17 (5)	34 (12)	77 (23)	22 (7)	Neg (Neg)	47 (14)	129 (39)
Bijawar	198047	56	67 (19)	90 (26)	71 (20)	19 (5)	—	21 (6)	84 (24)

APPENDIX I (*Contd.*)

District/taluk	Population 1971		Forests	Nac	Cw	Pp&gl	Mtc&g	Fallow lands	Net area sown
	Total	Per sq km							
	Rainfall Zone—VIII (Contd.)						*Rainfall Pattern—E_3 (A_1 C_1 E_1)E_4*		
Rewa									
Sirmaur	235004	156	22 (15)	15 (10)	—	14 (9)	Neg (Neg)	10 (7)	89 (59)
Huzur	296809	223	5 (4)	29 (21)	4 (3)	4 (3)	1 (1)	6 (5)	86 (63)
Mauganj	255460	137	12 (6)	23 (12)	12 (7)	11 (4)	Neg (Neg)	26 (14)	106 (57)
Teonthar	190621	120	27 (17)	32 (20)	3 (2)	9 (6)	Neg (Neg)	8 (5)	79 (50)
Panna									
Ajaigarh	70058	114	8 (13)	12 (20)	5 (8)	7 (11)		4 (6)	26 (42)
	Rainfall Zone—IX						*Rainfall Pattern—E_3 (A_2 C_2) E_4*		
Sagar									
Khurai	264876	125	12 (6)	13 (6)	7 (3)	25 (12)	— —	2 (1)	152 (72)
Sagar	408949	165	33 (13)	20 (8)	9 (4)	32 (13)	Neg Neg	2 (1)	151 (61)
Raisen									
Goharganj	79923	54	75 (50)	9 (6)	8 (5)	5 (3)	—	1 (2)	51 (34)
Ghairatganj	55342	70	25 (32)	3 (4)	4 (5)	4 (5)	— —	—	42 (54)
Raisen	85912	67	54 (42)	5 (4)	7 (5)	5 (4)	—	1 (1)	57 (44)
Vidisha									
Vidisha	206811	107	23 (12)	12 (6)	7 (4)	9 (4)	—	1 (1)	141 (73)
Basoda	203752	89	20 (9)	20 (9)	9 (4)	22 (10)	—	3 (1)	155 (67)
Kurwai	85146	102	Neg (Neg)	8 (10)	5 (6)	6 (7)	— —	1 (2)	63 (75)
Sagar									
Banda	144072	107	18 (13)	11 (8)	7 (5)	23 (17)	Neg (Neg)	6 (5)	69 (52)
Rehli	244394	103	39 (16)	13 (5)	13 (6)	30 (13)	Neg (Neg)	6 (3)	136 (57)
Damoh									
Damoh	381147	118	49 (15)	32 (10)	25 (8)	45 (14)	4 (1)	8 (2)	161 (50)
Raisen									
Baraily	120918	89	32 (23)	7 (5)	5 (4)	5 (4)	—	1 (1)	86 (63)
Silwani	63146	50	41 (39)	4 (3)	10 (10)	6 (5)	—	1 (1)	44 (42)
Begamganj	69165	78	22 (25)	3 (4)	9 (10)	4 (5)	—	1 (1)	49 (55)
Sehore									
Budni	67241	62	44 (41)	6 (6)	4 (4)	8 (7)	—	1 (1)	44 (41)
Guna									
Guna	178154	56	74 (23)	40 (13)	68 (21)	28 (9)	—	5 (2)	101 (32)
Ashoknagar	194314	82	10 (4)	31 (13)	20 (8)	20 (8)	—	4 (2)	153 (64)
Vidisha									
Sironj	106969	85	10 (8)	10 (8)	14 (11)	8 (6)	—	2 (2)	81 (65)
Lateri	55155	57	28 (28)	6 (7)	8 (8)	6 6	—	1 (1)	49 (50)

APPENDIX 1 (*Contd.*)

District/taluk	Population 1971 Total	Per sq km	Forests	Nac	Cw	Pp&gl	Mtc&g	Fallow lands	Net area sown
	Rainfall Zone—IX (contd.)						*Rainfall Pattern—E_4 (A_2 C_2) E_4*		
Sehore						(6)			
Huzur	470700	352	18 (13)	17 (13)	7 (5)	18 (13)	—	2 (1)	73 (55)
Sehore	159222	101	15 (9)	13 (8)	5 (3)	24 (15)	—	1 (1)	100 (63)
Ichhawar	61019	550	47 (42)	3 (3)	4 (4)	12 (11)	— —	Neg (Neg)	44 (40)
Berasia	101460	71	31 (22)	7 (5)	4 (3)	25 (17)	—	1 (1)	75 (52)
Nasrullaganj	79292	89	48 (35)	5 (4)	6 (5)	14 (10)	—	1 (1)	61 (45)
Damoh Hatta	192116	96	18 (9)	20 (10)	16 (8)	26 (13)	Neg (Neg)	6 (3)	114 (57)
Satna Maihar	141958	126	6 (5)	37 (33)	9 (8)	2 (2)	Neg (Neg)	6 (6)	51 (46)
Amarpatan	180749	144	20 (16)	20 (16)	6 (5)	1 (1)	1 (1)	7 (5)	70 (56)
Raghurajnagar	412117	128	49 (15)	63 (19)	28 (9)	17 (5)	8 (2)	15 (5)	143 (44)
Guna Raghogarh	143151	73	13 (7)	41 (21)	19 (10)	16 (8)	—	2 (1)	105 (53)
Chachaura	104987	88	15 (13)	15 (13)	9 (8)	9 (8)	—	2 (1)	69 (57)
Rajgarh Biaora	114197	99	6 (5)	11 (10)	7 (6)	19 (16)	—	1 (1)	71 (62)
Narsingarh	147396	110	5 (4)	8 (6)	7 (5)	17 (13)	—	2 (1)	96 (71)
Shajapur Shujalpur	194727	118	—	6 (7)	5 (5)	12 (14)	—	1 (1)	66 (73)
Panna Pawai	162073	54	75 (25)	78 (26)	37 (13)	4 (1)	—	15 (5)	89 (30)
Jabalpur Murwara	387976	142	27 (10)	26 (10)	22 (8)	36 (13)	3 (1)	25 (9)	133 (9)
Shahdol Beohari	169825	65	118 (45)	27 (10)	14 (5)	14 (5)	—	21 (8)	68 (26)
Raisen Udaipur	78620	101	9 (12)	4 (5)	4 (5)	3 (4)	—	1 (1)	57 (73)
Shahdol Bandhogarh	203863	56	153 (42)	37 (10)	32 (9)	22 (6)	Neg (Neg)	33 (9)	86 (24)
Jabalpur Patan	175193	125	5 (3)	12 (9)	5 (3)	12 (9)	1 (1)	4 (3)	101 (72)
	Rainfall Zone—X						*Rainfall Pattern—E_4 (A_2 C_2 D_1E_3*		
Bilaspur Janjgir	409548	192	8 (4)	20 (9)	5 (3)	28 (13)	— —	11 (5)	141 (66)
Bilaspur	840655	178	114 (24)	36 (8)	11 (2)	47 (10)	— —	21 (5)	242 (51)
Raipur Balod Bazar	598863	167	30 (8)	32 (9)	7 (2)	36 (10)	— —	22 (6)	231 (64)
Surguja Baikunthpur	108029	125	24 (28)	8 (9)	5 (6)	1 (1)	Neg (1)	6 (7)	43 (49)
Mahendragarh	145807	131	47 (42)	9 (8)	2 (1)	6 (6)	— —	9 (8)	39 (35)
Durg Bemetara	384476	135	— —	17 (6)	4 (1)	30 (11)	— —	9 (4)	225 (79)
Bilaspur Mungaoli	415635	167	19 (8)	15 (6)	6 (3)	26 (16)	— —	8	175 (70)

APPENDIX 1 (*Contd.*)

District/taluk	Population 1971		Forests	Nac	Cw	Pp&gl	Mtc&g	Fallow lands	Net area sown
	Total	Per sq. km							
	Rainfall Zone—XI		..	..	..	..	*Rainfall Pattern—$E_4(A_2B_1C_1)$*		E_4
Sidhi									
Gopadbanano	440669	93	191	70	14	—	—	26	170
			(40)	(15)	(3)			(6)	(36)
Jabalpur									
Sihora	364716	128	37	49	20	36	Neg	15	129
			(13)	(17)	(7)	(3)	(Neg)	(5)	(45)
Sidhi									
Deosar	196746	52	161	80	22	—	—	23	91
			(43)	(21)	(6)			(6)	(24)
Sidhi									
Singrauli	139371	73	80	40	6	—	—	9	55
			(42)	(21)	(3)			(5)	(29)
Hoshangabad									
Seonimalwa	97756	95	8	7	11	6	Neg	2	68
			(8)	(7)	(11)	(6)	(Neg)	(2)	(56)
Sohagpur	202018	96	53	13	13	17	—	5	110
			(25)	(6)	(6)	(8)		(3)	(52)
Hoshangabad	265661	149	25	16	12	17	—	5	(58)
			(14)	(9)	(7)	(9)		(3)	(58)
Jabalpur									
Jabalpur	758145	334	16	36	17	27	(Neg)	23	107
			(7)	(16)	(8)	(12)	(Neg)	(10)	(47)
Narsimhapur									
Gadharwara	249401	114	31	13	10	24	2	5	134
			(14)	(6)	(5)	(11)	(1)	(2)	(61)
Narsimhapur	269869	118	40	11	9	24	—	8	36
			(17)	(5)	(4)	(11)	—	(4)	(59)
	Rainfall Zone—XII						*Rainfall Pattern—$E_4(A_2B_1C_1)$*		D_1E_3
Shahdol									
Sohagpur	547578	94	189	59	48	9	1	55	223
			(32)	(10)	(8)	(2)	(Neg)	(10)	(38)
Balaghat									
Baihar	194747	77	124	17	14	7	2	12	74
			(49)	(7)	(6)	(3)	(1)	(5)	(29)
Surguja									
Bharatpur	37238	16	153	41	17	—	—	3	17
			(66)	(18)	(7)	—	—	(1)	(7)
Mandla									
Mandla	411622	120	48	47	18	27	1	43	159
			(14)	(14)	(5)	(8)	(—)	(12)	(47)
Seoni									
Seoni	412537	117	65	22	15	25	—	23	201
			(18)	(6)	(4)	(7)		(7)	(57)
Shahdol									
Pushprajgarh	108573	62	33	26	13	6	Neg	20	78
			(19)	(15)	(7)	(3)	(Neg)	(11)	(44)
Mandla									
Niwas	231385	90	22	40	14	9	—	51	122
			(9)	(15)	(5)	(4)		(20)	(47)
Seoni									
Lakhnadan	255815	83	47	21	16	17	—	41	169
			(15)	(7)	(5)	(6)		(13)	(54)
	Rainfall Zone—XIII		..	..	..	..	*Rainfall Pattern—E_4 (A_2B_2)*		D_1E_3
Raigarh									
Raigarh	279301	212	5	15	4	19	—	7	81
			(4)	(12)	(3)	(14)		(6)	(61)
Saranggarh	217491	220	1	14	4	7	—	3	70
			(1)	(14)	(4)	(7)		(3)	(71)
Bilaspur									
Sakti	345181	225	5	15	2	13	—	4	115
			(3)	(10)	(1)	(8)		(3)	(75)
Katghora	429943	100	201	49	10	21	—	15	136
			(47)	(11)	(2)	(5)		(3)	(32)
Raipur									
Mahasamund	562844	152	45	30	13	30	—	11	238
			(12)	(8)	(4)	(8)		(4)	(64)

APPENDIX 1 (*Concld.*)

District/taluk	Population 1971		Forests	Nac	Cw	Pp&gl	Mtc&g	Fallow lands	Net area sown
	Total	Per sq km							
	Rainfall Zone—XIII (contd.)						*Rainfall Pattern—E_4 (A_2 B_2) D_1E_3*		
Bindranawagarh	279102	99	98	21	23	16	—	11	113
			(35)	(7)	(8)	(6)		(4)	(40)
Bastur									
Bijapur	117650	32	195	20	23	64	—	8	60
			(53)	(5)	(6)	(17)		(2)	(16)
Surguja									
Surajpur	341601	74	198	21	5	67	6	20	145
			(43)	(5)	(1)	(15)	(1)	(5)	(30)
Ambikapur	435042	100	153	25	6	37	11	22	180
			(35)	(6)	(1)	(8)	(3)	(5)	(42)
Raigarh									
Jaspur	387935	85	62	129	6	41	—	37	182
			(14)	(28)	(1)	(9)		(8)	(40)
Udaipur	22092	124	53	14	2	9	—	9	92
			(30)	(8)	(1)	(5)		(5)	(51)
Gharghoda	173051	116	13	11	2	32	—	10	81
			(9)	(7)	(1)	(21)		(7)	(55)
Balaghat									
Balaghat	348762	167	82	16	3	15	1	4	87
			(39)	(8)	(1)	(7)	(1)	(2)	(42)
Wara Seoni	434074	219	35	21	7	15	Neg	6	113
			(18)	(11)	(3)	(8)	(Neg)	(3)	(57)
Raipur									
Raipur	762533	263	2	31	15	41	—	20	181
			(1)	(11)	(5)	(14)		(7)	(62)
Dhamtari	410189	198	19	23	6	20	—	6	113
			(9)	(11)	(3)	(1)		(3)	(64)
Durg									
Durg	743997	248	—	37	10	34	—	17	203
			—	(12)	(3)	(11)		(6)	(68)
Sanjanbalod	485543	126	84	37	9	33	Neg	28	193
			(22)	(10)	(2)	(9)	(Neg)	(7)	(50)
Bastar									
Kankar	186126	106	23	32	4	24	—	10	82
			(13)	(18)	(2)	(14)		(6)	(47)
B. Pratappor	74703	54	28	19	7	26	—	9	48
			(20)	(14)	(5)	(19)		(7)	(35)
Narayanpur	162529	52	188	14	14	27	—	11	60
			(60)	(4)	(4)	(9)		(4)	(19
Jagdalpur	431437	105	105	39	8	62	—	21	173
			(26)	(10)	(2)	(15)		(5)	(42)
Konta	132151	110	18	1	9	3	—	13	76
			(15)	(1)	(7)	(2)		(11)	(64
Surguja									
Samri	98797	60	55	7	3	20	18	13	48
			(33)	(4)	(2)	(12)	(11)	(8)	(30)
Durg									
R. Nandgaon	334599	172	8	17	3	15	—	13	138
			(4)	(9)	(1)	(8)		(7)	(71)
Bastur									
Kondagaon	248242	67	201	24	16	16	—	12	100
			(55)	(7)	(4)	(4)		(3)	(27)
Dantewara	163117	74	32	35	14	14	—	20	104
			(15)	(16)	(6)	(6)		(9)	(47)
Surguja									
Pal	159925	50	184	13	4	21	24	15	62
			(57)	(4)	(1)	(7)	(7)	(5)	(19)

APPENDIX 2

Districtwise Livestock Population—1966

MADHYA PRADESH

(thousands)

District	Cattle			Buffaloes			Sheep	Goats	Horses & Ponies	Mules	Donkeys	Camels	Pigs	Total Live-stock
	Male	Female	Young stock	Male	Female	Young stock								
Balaghat	208	128	139	47	26	25	—	146	1	—	—	—	7	72 7
	(29)	(18)	(19)	(6)	(4)	(3)	(—)	(20)	(—)				(1)	
Bastar	378	373	388	91	22	22	9	394	—	—	—	—	142	1819
	(21)	(20)	(21)	(5)	(1)	(1)	(1)	(22)			—		(8)	
Betul	228	45	142	2	29	30	3	106	3	—	1	—	4	6637
	(34)	(17)	(21)	(—)	(4)	(5)	(1)	(16)	(1)		(—)		(1)	
Bhind	107	61	66	3	77	70	59	91	2	—	2	2	7	547
	(20)	(11)	(12)	(1)	(14)	(13)	(11)	(17)	(—)		(—)	(—)	(1)	
Bilaspur	361	402	486	275	38	41	18	209	5	—	—	—	6	1841
	(20)	(22)	(26)	(15)	(2)	(2)	(1)	(11)	(—)				(—)	
Chattarpur	232	213	203	5	86	67	76	243	1	—	1	—	12	1139
	(20)	(19)	(18)	(—)	(6)	(6)	(7)	(21)	(—)		(—)		(1)	
Chhindwara	251	162	192	3	40	36	3	169	6	—	1	—	4	867
	(29)	(19)	(22)	(—)	(5)	(4)	(—)	(19)	(1)		(—)		(1)	
Damoh	152	134	150	2	37	32	7	59	2	—	1	—	5	581
	(26)	(23)	(26)	(—)	(6)	(6)	(1)	(10)	(—)		(—)		(1)	
Datia	51	38	41	—	25	19	27	59	1	—	1	—	3	265
	(19)	(14)	(16)	(—)	(10)	(7)	(10)	(22)	(—)		(—)		(1)	
Dewas	121	107	121	1	56	48	10	98	2	—	1	1	1	56
	(21)	(19)	(21)	(—)	(10)	(8)	(2)	(17)	(—)		(—)	(—)	(—)	
Dhar	193	130	147	2	60	51	11	209	4	—	3	—	—	810
	(24)	(15)	(18)	(—)	(7)	(6)	(2)	(26)	(1)		(—)	—	(—)	
Durg	447	428	527	184	49	50	54	221	3	—	—	—	12	1975
	(23)	(22)	(27)	(9)	(2)	(2)	(3)	(11)	(0·2)				(1)	
Gwalior	106	105	79	2	58	39	45	97	2	—	2	—	4	539
	(20)	(19)	(15)	(—)	(11)	(7)	(8)	(18)	(—)		(—)		(1)	
Guna	237	184	146	1	91	102	17	86	3	—	1	—	2	870
	(27)	(21)	(17)	(—)	(10)	(12)	(2)	(10)	(—)		(—)		(—)	
Hoshangabad	191	125	159	2	45	41	39	100	4	—	1	—	2	709
	(27)	(18)	(22)	(—)	(6)	(6)	(6)	(14)	(1)		(—)		(—)	
Indore	66	60	67	1	45	27	7	78	2	—	1	—	2	356
	(18)	(17)	(19)	(—)	(13)	(7)	(2)	(22)	(1)		(—)		(1)	
Jabalpur	284	187	234	14	59	51	14	167	4	—	—	—	17	1031
	(28)	(18)	(23)	(1)	(6)	(5)	(1)	(16)	(—)		(—)		(2)	
Jhabua	223	135	135	2	46	36	3	225	2	—	2	—	—	809
	(27)	(17)	(17)	(—)	(6)	(5)	(—)	(—)	(—)		(—)			
Mandla	231	190	219	38	50	49	2	95	10	—	—	—	8	892
	(26)	(21)	(25)	(4)	(6)	(5)	(—)	(11)	1)				1	

Mandsaur	163 (15)	190 (17)	199 (18)	2 (—)	79 (7)	77 (7)	89 (8)	289 (26)	6 (1)	—	—	(1)	1 (—)	1106
Morena	190 (20)	183 (19)	165 (17)	1 (—)	111 (11)	96 (10)	30 (3)	184 (19)	2 (—)	—	4 (—)	3 (—)	5 (1)	974
Narsimhapur	98 (23)	88 (21)	48 (28)	1 (—)	25 (6)	23 (5)	8 (2)	54 (13)	3 (1)	—	2 (—)	—	5 (1)	425
East Nimar (Khandwa)	195 (30)	109 (17)	131 (20)	2 (—)	51 (8)	39 (6)	17 (3)	108 (16)	2 (—)	—	1 (—)	—	2 (—)	657
West Nimar (Khargone)	272 (26)	168 (16)	171 (16)	3 (—)	98 (9)	69 (7)	7 (1)	263 (25)	3 (—)	—	4 (—)	—	2 (—)	1060
Panna	149 (24)	133 (21)	147 (24)	7 (1)	51 (8)	43 (7)	14 (2)	76 (12)	1 (—)	— (—)	— (—)	—	4 (1)	625
Raigarh	292 (25)	184 (16)	230 (19)	109 (9)	20 (2)	21 (2)	36 (3)	251 (21)	5 (—)	—	—	—	34 (3)	1182
Raipur	479 (25)	428 (22)	505 (26)	214 (11)	43 (2)	46 (2)	37 (2)	184 (10)	1 (—)	—	1 (—)	—	10 (1)	1948
Raisen	160 (31)	113 (22)	124 (24)	1 (—)	34 (7)	26 (5)	5 (1)	49 (9)	4 (1)	—	1 (—)	—	2 (—)	519
Rajgarh	127 (17)	129 (17)	137 (19)	1 (—)	94 (13)	88 (12)	10 (1)	143 (19)	4 (1)	—	3 (1)	— (—)	2 (—)	738
Ratlam	93 (17)	91 (17)	96 (18)	1 (—)	46 (9)	40 (7)	21 (4)	140 (26)	4 (1)	—	3 (1)	— (—)	1 (—)	536
Rewa	281 (30)	179 (19)	184 (20)	12 (1)	58 (6)	42 (5)	19 (2)	148 (16)	4 (—)	—	—	— (—)	13 (1)	930
Satna	253 (27)	178 (19)	188 (20)	11 (2)	54 (6)	45 (5)	29 (3)	151 (16)	2 (—)	—	— (—)	—	10 (1)	921
Sagar	229 (26)	201 (23)	219 (25)	2 (—)	64 (7)	52 (6)	17 (2)	71 (8)	4 (1)	— (—)	2 (—)	1 (—)	4 (1)	866
Sehor.	187 (26)	154 (21)	162 (22)	1 (—)	68 (9)	53 (7)	6 (1)	89 (12)	4 (1)	—	2 (—)	—	2 (—)	728
Seoni	178 (31)	114 (20)	143 (25)	2 (—)	34 (6)	33 (6)	1 (—)	66 (11)	4 (1)	—	— (—)	—	6 (1)	591
Shahdol	299 (26)	226 (19)	273 (23)	82 (7)	47 (4)	47 (4)	14 (1)	163 (14)	6 (1)	— (—)	— (—)	—	6 (1)	1163
Shajapur	121 (16)	158 (21)	154 (21)	1 (—)	69 (9)	61 (8)	6 (1)	159 (22)	4 (1)	—	3 (—)	1 (—)	3 (—)	740
Shivpuri	234 (21)	216 (19)	209 (19)	1 (—)	83 (7)	64 (6)	101 (9)	209 (19)	2 (—)	—	2 (—)	1 (—)	3 (—)	1125
Sidhi.	259 (25)	192 (18)	201 (19)	2 (—)	64 (6)	49 (5)	29 (3)	242 (23)	5 (—)	—	—	— (—)	5 (1)	1048
Surguja	399 (26)	277 (18)	281 (18)	99 (7)	48 (3)	40 (3)	2 (—)	352 (23)	15 (1)	—	—	—	16 (1)	1539
Tikamgarh	175 (21)	142 (17)	162 (19)	2 (—)	51 (6)	45 (5)	80 (10)	175 (21)	1 (—)	—	1 (—)	—	5 (1)	839
Ujjain	108 (17)	119 (18)	123 (19)	1 (—)	68 (11)	57 (9)	21 (3)	140 (22)	3 (1)	—	3 (—)	1 (—)	1 (—)	645
Vidisha	194 (33)	113 (20)	120 (21)	1 (—)	47 (8)	35 (6)	11 (2)	50 (9)	4 (1)	—	2 (—)	— (—)	1 (—)	578

neg—negligible

Note : Figures in brackets represent percentages to total livestock.

APPENDIX 3

Rainfall and Cropping Patterns

MADHYA PRADESH

Cropping patterns	District/ taluk	Geo-graphi-cal area (sq km)	Elevation (masl) max	Elevation (masl) min	Annual rainfall total (cm)	rd	mmr	mr	nd	*Consecutive months a	b	c
	Rainfall Zone—I									*Rainfall Pattern—E_4 (C_4) E_4*		
Jk_4 C_4 Gn_4 Pu_4/W_4	**Khargone** (West Nimar)											
	Barwani	675	900	198	64	42	7	31	24	6-4	57	38
	Rajpur	1310	300	150	72	38	7	36	20	6-4	63	33
Jk_4 M_4 Pu_4 C_4 Gn_4/W_4	**Dhar** Manasar	2226	450	150	70	37	7	35	21	6-4	62	33
	Rainfall Zone—II									*Rainfall Pattern—E_4 (B_1 C_3) E_4*		
Jk_3 C_4 B_4 Pu_4/W_4	**Khargone** Khargone	1830	968	300	89	43	7	46	22	6-4	79	37
	Kasraiwad	1011	303	150	NA							
Pu_3 Jk_4 B_5C_5	Sendhwa	1338	600	198	NA							
Jk_3 C_4 Pu_4/F_4	Bhikan Gaon	1594	600	300	NA							
Jk_4 C_4 Gn_4 Pu_4/W_4	Maheshwar	804	600	150	82	40	7	45	23	6-4	75	36
C_3 Jk_4 Pu_4	Barwaha	1211	600	300	96	44	7	57	25	6-4	89	39
C_3 Jk_4 Pu_4	**Khandwa** (East Nimar)	1459	673	300	82	43	7	39	22	6-4	73	37
Jk_3 C_4 Pu_4/F_4	Burhampur Khandwa	3056	329	221	82	43	7	43	23	6-4	72	37
	Rainfall Zone—III									*Rainfall Pattern—E_4 (B_2 C_1 E_1) E_4*		
W_3 G_4 $Jk_4/Pd_4/O_4$	**Bhind** Gohad	1028	248	150	62	32	8	40	19	7-3	53	24
	Gwalior Pichhore	1874	392	305	69	35	8	45	21	7-3	57	26
	Bhauder	654	242	150	75	36	8	51	22	7-3	63	27
	Datia Seondha	926	169	150	69	32	7	45	20	7-3	58	26
	Datia	1109	300	150	79	39	8	51	23	7-3	65	29
W_3 Jk_4 $G_4/O_4/F_4$	**Morena** Sheopur	3773	498	223	77	36	7	56	24	7-3	66	29
	Shivpuri Shivpuri	1956	486	300	75	33	7	48	20	7-3	61	25
W_4 Jk_4 O_4 F_4/G_4	**Gwalior** Gwalior	2690	433	300	82	46	7	53	28	7-3	72	35
	Shivpuri Karera	2294	370	300	75	33	7	48	20	7-3	61	25
	Pohri	1573	459	300	NA							

masl = metres above sea level
rd = rainy days
mmr = month of maximum rainfall
mr = total rainfall of mmr plus that of preceding or following month, whichever is higher, in cm
nd = number of rainy days of mmr plus that of preceding or following month, whichever has higher rainfall.

*Consecutive months with rainfall of more than 10 cm per month.
a=Initial month with more than 10 cm of rainfall and number of consecutive months with more 10 cm/month, separated by hyphen
b=Total rainfall of consecutive months under 'a' in cm
c=Total number of rainy days of consecutive months under 'a'
na=not available.

NOTES : 1. Information on rainfall and rainy days are based on the Memoirs of India Meteorological Department, Vol. XXXI, Part III as on 12th May, 1961.

2. For explanation of coded form of rainfall and cropping patterns, reference may be made to section 2 in the text.

APPENDIX 3 (*Contd.*)

Cropping patterns	District/ taluk	Geo-graphi-cal area (sq km)	Elevation (masl)		Annual rainfall					*Consecutive months		
			max	min	total (cm)	rd	mmr	mr	nd	a	b	c
	Rainfall Zone—III (contd.)		..		..	..	..	..	*Rainfall Pattern—E_4 (B_2 C_1 E_1) E_4*			
W_4 Jk_4 O_4 F_4 Mt_4 M_4/Pu_4	**Shivpuri** Pichhore	2383	437	392	88	37	7	57	22	7-3	72	28
Jk_3 Pu_4 W_4	**Mandsaur** Bhanpura	1039	508	450	NA							
Jk_3 C_4 Gn_4	**Shajapur** Susner	1272	450	426	87	38	7	56	22	6-4	80	33
Jk_4 F_4 W_4 G_4 Pu_4	**Ratlam** Jaora	1360	529	450	80	38	7	50	22	6-4	75	33
Jk_3 F_4 C_4 W_4	Alot	946	450	300	NA							
Jk_3 W_4 F_4/G_4	**Shivpuri** Kalaras	2294	499	300	78	39	7	51	23	7-3	64	30
Jk_3 Pu_4 F_4 Gn_4/W_4	**Mandsaur** Manasa	1517	587	450	88	39	7	60	24	6-4	85	36
	Malhargarh	806	467	450	NA							
	Mandsaur	1266	473	450	76	36	7	50	20	7-3	61	26
	Neemuch	855	519	450	79	36	7	51	21	7-3	64	27
	Garoth	1137	484	450	95	41	7	64	24	6-4	90	36
Jk_3 F_4 Gn_4 M_5	Sitaman	1274	296	450	75	37	7	49	22	7-3	61	28
G_4 W_4 O_4 B_4/Jk_4	**Morena** Jaura	1594	489	300	67	32	7	45	20	7-3	57	25
	Sabalgarh	1298	361	300	73	34	7-8	51	21	7-3	61	26
B_3 O_4 W_4/G_4	Bijeypur	2893	444	300	72	34	7	51	22	7-3	62	27
F_4 W_4 M_4 Jk_4	**Mandsaur** Jawad	1570	614	450	81	35	7	58	22	7-3	69	31
G_4 W_4 O_4 B_4/Jk_4	**Bhind** Mehgaon	969	190	150	64	31	8	43	19	7-3	55	24
	Lahar	1081	169	150	70	35	7-8	45	21	7-3	58	26
	Bhind	1373	159	150	71	35	8-7	48	21	7-3	60	27
	Morena Morena	1069	248	150	71	33	7	47	21	7-3	60	26
	Ambah	1061	181	150	71	32	7	45	19	7-3	58	24
	Rainfall Zone—IV		..	..	..	..	..	..	*Rainfall Pattern—E_4 (B_2 C_2) E_4*			
W_3 Jk_4 G_4 F_4/Pu_4	**Indore** Indore	950	581	480	93	48	7	53	26	6-4	84	41
	Depalpur	1022	561	450	96	46	7	55	25	6-4	88	40
	Sawer	762	512	450	NA							
W_3 Jk_4 G_4 F_4/Fu_4	**Ujjain** Badnagar	1225	594	450	76	36	7	41	19	6-4	69	32
W_4 G_4 F_4 Pu_4 Jk_4/C_4	**Ratlam** Ratlam	1331	594	450	95	45	7	59	27	6-4	89	41
—Do.—	**Dhar** Dhar	1908	761	150	93	50	7	51	29	6-4	85	45
	Badnawar	1065	557	450	86	41	7	50	25	6-4	83	38
M_3 Jk_4 Pd_4 Mt_4 $/C_4$	**Jhabua** Jhabua	1442	544	300	78	42	7	47	26	6-4	73	39
	Jhandla	1045	499	300	NA							
M_4 Jk_4 Mt_4 C_4 F_4	**Ratlam** Saitana	1229	450	300	94	45	7	61	28	6-4	90	41
Jk_3 W_4 F_4 C_4/G_4	**Ujjain** Khacharod	1283	489	450	78	38	7	46	21	6-4	72	33
	Mahidpur	1131	529	450	100	46	7	61	26	6-4	92	40
	Tarana	1042	512	450	103	48	7	64	27	6-4	95	42
Jk_4 Pu_4 M_4 Gn_4 C_4	**Dhar** Kukshi	1717	300	206	NA							

APPENDIX 3 (*Contd.*)

Cropping patterns	District/ taluk	Geo-graphi-cal area (sq km)	Elevation (masl) max	Elevation (masl) min	Annual rainfall total (cm)	rd	mmr	mr	Consecutive months nd	a	b	c
	Rainfall Zone—IV (concld.)	..	..	..	..			*Rainfall Pattern—E_4 (B_2C_2) E_4*				
Jk_4 F_4 W_4 G_4/C_4	**Dewas**											
	Dewas	1005	600	536	105	49	7	62	27	6-4	94	34
W_4 F_4 C_4/G_4	**Ujjain**											
	Ujjain	1393	512	450	89	40	7	55	22	6-4	82	35
F_4 Jk_4 W_4 G_4	**Indore**											
	Mhow	805	881	450	102	48	7	56	26	6-4	93	42
C_4 Gn_4 W_4 G_4 Pu_4 F_4	**Dhar**											
	Sardarpur	1292	544	450	90	44	7	52	26	6-4	83	40
C_4 Pu_4 Mt_4 Gn_4 F_4	**Jhabua**											
	Petlawad	956	499	450	NA							
Mt_4 Pu_4 Jk_4 B_4/M_4	Jobat	1099	450	300	NA							
	Alirajpur	2250	600	300	88	47	7	52	29	6-4	82	42
	Rainfall Zone—V ..	..	..	..	..			*Rainfall Pattern—E_4 (A_1 B_1 C_1 E_1) E_4*				
Jk_3 C_4 Gn_4/W_5	**Shajapur**											
	Shajapur	1807	609	450	105	44	7	68	24	6-4	97	38
	Agar	1454	511	450	93	44	7	60	25	6-4	86	38
Jk_3 F_4 C_4 M_4/W_4	**Raj Garh**											
	Raj Garh	1081	498	399	113	48	7	73	27	6-4	104	41
	Khilchipur	1637	498	426	87	44	7	57	25	7-3	71	32
	Sarangpur	905	600	450	112	49	7	71	27	6-4	12	40
W_3 Jk_4 $G_4/F_4/O_4/C_4$	**Guna**											
	Mungaoli	2295	606	450	91	44	7	58	25	6-4	83	38
	Rainfall Zone—VI	..	..	..	..	..		*Rainfall Pattern—E_4 (A_1 B_1 C_2) E_4*				
Jk_3 C_4 F_4/Pu_4	**Dewas**											
	Kannod	1405	450	300	118	55	7	72	30	6-4	109	47
Jk_3 Gn_4 T_4	**Chhindwara**											
	Sauser	1972	600	450	104	59	7	55	30	6-4	87	48
Jk_4 Mt_4 W_4 O_4 G_4	Chhindwara	4485	1164	450	106	60	7	55	29	6-4	89	47
	Amarwara	3678	1061	450	117	67	7	60	31	6-4	96	51
Jk_4 W_4 Mt_4 Pu_4 G_4/T_4	**Betul**											
	Multai	2336	900	450	101	59	7	52	29	6-4	58	47
	Bhainsdehi	2309	770	450	109	61	7	57	30	6-4	92	49
Jk_4 F_4 W_4 G_4/C_4	**Dewas**											
	Bagli	1925	635	450	NA							
	Sonkach	1289	536	450	102	43	7	62	24	6-4	95	38
Mt_3 W_4 G_4 Jk_4	**Betul**											
	Betul	2417	1350	450	119	62	7	68	32	6-4	103	51
W_3 Jk_4 $F_4/C_4/G_4/O_4$	**Dewas**											
	Khategaon	1099	450	300	NA							
	Sehore											
	Ashta	1455	489	450	105	47	7	67	26	6-4	97	41
W_3 O_4 C_4/Pu_4	**Hoshangabad**											
	Harda	2525	600	300	112	49	7	67	26	6-4	102	42
C_4 Jk_4 Pd_4 Mt_4	**Khandwa**											
	Harsud	1865	438	300	99	45	7	57	25	6-4	89	39
	Rainfall Zone—VII	..	..	..	..	..		*Rainfall Pattern—E4 (A1 B1 C2) D1 E3*				
Pd_3 Mt_4 Pu_4/G_4	**Durg**											
	Khaira Garh	2281	770	300	117	64	7	61	30	6-4	98	50
	Kawardha	1644	918	300	111	67	7	57	32	6-4	91	53
	Rainfall Zone—VIII	..	..	..	..	..		*Rainfall Pattern—E_4 (A_2 C_1 E_1) E_4*				
W_3 Jk_4 G_4	**Chhatarpur**											
	Laundi	1764	329	300	NA							

APPENDIX 3 (*Contd.*)

Cropping patterns	District/ taluk	Geographical area (sq km)	Elevation (msl) max	Elevation (msl) min	Annual rainfall total (cm)	rd	mmr	mr	nd	*Consecutive months a	b	c
	Rainfall Zone—VIII (contd.)	..	..	..	..	..	..	*Rainfall Pattern—E_4 (A_2 C_1 E_1) E_4*				
W_3 Pd_4 O_4/G_4	**Panna**											
	Panna	2806	557	150	121	58	7	79	33	6-4	109	48
	Satna											
	Nagod	1816	557	300	110	54	7	70	30	7-3	88	38
W_4 Mt_4 F_4 Jk_4/Pd_4	**Tikamgarh**											
	Tikamgarh	1716	443	300	100	47	7	64	27	7-3	81	34
	Jatara	1739	411	300	n.a.							
	Niwari	1171	322	300	n.a.							
W_4 Mt_4 F_4 O_4 Ba_4	**Chhatarpur**											
	Chhatarpur	3350	351	300	107	50	7	69	29	6-4	97	42
	Bijawara	3516	547	300	113	51	7	76	31	6-4	104	44
W_4 Pd_4 Mt_4 G_4/O_4	**Rewa**											
	Sirmaur	1504	431	150	125	58	7-8	77	32	6-4	110	47
	Huzur	1332	399	300	n.a.							
Pd_3 Mt_4 W_4/O_4	Mawaganj	1867	344	150	123	59	7	78	33	6-4	109	48
Pd_4 G_4 W_4 Jk_4 Ba_4	Teonthar	1585	423	150	113	56	8	71	31	7-3	91	40
G_4 W_4 O_4 Ba_4	**Panna**											
	Ajai Garh	612	348	150	114	50	8-7	75	30	7-3	95	38
	Rainfall Zone—IX ..	..	..	..	..	..	..	*Rainfall Pattern—E_4 (A_2 C_2) E_4*				
W_2 $G_4/F_4/Pu_4/Jk_4$	**Sagar**											
	Khurai	2113	569	450	121	55	7	79	32	6-4	111	47
	Sagar	2480	620	450	123	59	7	79	32	6-4	111	49
	Raisen											
	Ghairat Ganj	1479	629	600	126	59	7	79	33	6-4	115	51
	Goharganj	789	629	450	134	57	7	86	32	6-4	122	50
	Raisen	1291	666	450	125	55	7	79	31	6-4	114	47
	Vidisha											
	Vidisha	1937	569	450	116	51	7	72	29	6-4	104	44
	Basoda	2292	450	415	114	47	7	73	27	6-4	105	41
	Kurwai	831	450	425	110	51	7	71	27	6-4	100	43
W_3 F_4 Pu_4	**Sagar**											
	Banda	1314	652	450	110	53	7	70	30	6-4	99	44
W_3 Pd_4 G_4/O_4	Rehli	2381	503	440	118	56	7	74	30	6-4	106	47
	Damoh											
	Damoh	3236	752	300	117	57	8-7	76	32	6-4	106	48
W_3 Pu_4 G_4	**Raisen**											
	Baraily	1385	450	438	115	53	7	73	30	6-4	105	46
	Sitwani	1044	721	450	136	59	7	87	34	6-4	126	52
	Begumganj	882	691	450	137	59	7	87	33	6-4	126	51
	Sehore											
	Budni	1076	646	300	na							
W_3 Jk_4 $G_4/F_4/O_4$	**Guna**											
	Guna	3155	497	300	110	48	7	71	28	6-4	101	41
	Ashok Nagar	2379	568	450	na							
	Vidisha											
	Shironj	1255	549	450	na							
	Lateri	986	662	534	na							
W_3 Jk_4 $F_4/C_4/G_4/O_4$	**Sehore**											
	Huzur	1339	625	450	na							
	Sehore	1584	489	450	141	55	7	91	31	6-4	133	49
	Ichhawar	111	642	450	124	56	7	79	32	6-4	114	48
	Berasia	1424	585	450	105	48	7	67	28	6-4	97	42
	Nasrulla Ganj	1353	450	300	133	54	7	86	32	6-4	122	48

APPENDIX 3 (*Contd.*)

Cropping patterns	District/ taluk	Geo-graphical area (sq km)	Elevation masl) max	Elevation masl) min	Annual rainfall total (cm)	rd	mmr	mr	nd	*Consecutive months a	b	c
	Rainfall Zone—IX (contd.)	..	..	..	..	..		*Rainfall Pattern—E_4 (A_2 C_2) E_4*				
W_3 O_4 Pu_4 G_4 .	**Damoh**											
	Hatta	2011	450	300	121	54	7	75	30	6-4	108	45
W_4 Pd_4 Mt_4 G_4/O_4 .	**Satna**											
	Maihar	1126	607	300	106	54	7	65	30	6-4	92	44
	Amarpatan	1253	690	299	na							
	Raghuraj Nagar	3230	378	150	na							
Jk_3 W_4 F_4/G_4 . .	**Guna**											
	Raghagarh	1960	560	300	na							
	Chachausar Rajgarh	1193	513	300	114	45	7	77	27	6-4	106	39
	Biaora	1148	450	399	121	51	7	80	29	6-4	111	44
	Narsinghgarh	1346	450	399	118	50	7	78	29	6-4	110	43
W_3 Jk_4 $F_4/C_4/G_4$.	**Shajapur**											
	Shujalpur	1807	535	448	106	45	7	68	25	6-4	98	39
Pd_3 Mt_4 O_4	**Shahdol**											
	Beohari	2628	600	443	na							
Pd_3 W_4 G_4 Mt_4/O_4	**Panna**											
	Pawai	2967	519	300	na							
Pd_3 W_4 G_4 Mt_4/O_4	**Jabalpur**											
	Murwara	2736	692	300	122	61	81	75	33	6-4	106	49
Pu_4 W_4 G_4 Jk_4	**Raisen**											
	Udaipur	776	600	450	139	59	7	87	34	6-4	126	52
Mt_3 Pd_4 O_4	**Shahdol**											
	Bandugarh	3630	880	300	na							
G_4 W_4 Pu_4 Jk_4	**Jabalpur**											
	Patan	1406	529	150	128	60	7	79	33	6-4	113	49
	Rainfall Zone—X	..	..	..	..	..		*Rainfall Pattern—E_4 (A_2 C_2) D_1 E_3*				
Pd_1	**Bilaspur**											
	Janjgir	2137	300	258	138	67	7	82	35	6-4	123	55
	Bilaspur	4720	1057	246	133	69	8-7	77	35	6-4	115	56
Pd_2 Mt_4 Pu_4	**Raipur**											
	Balodbazar	3584	276	246	134	64	8	79	33	6-4	119	32
Pd_3 Mt_4 Pu_4	**Surguja**											
	Baikunthpur	866	854	300	148	78	7	86	38	6-4	126	60
	Manendra Garh	1113	681	300	na							
Pd_3 Mt_4 Pu_4/G_4	**Durg**											
	Bemetara	2853	300	285	112	64	7	67	31	6-4	105	51
	Bilaspur											
	Mungeli	2495	617	303	119	69	7	66	34	6-4	102	55
	Rainfall Zone—XI	..	..	..	..	..		*Rainfall Pattern—E_4 (A_2 B_1 C_1) E_4*				
Pd_4 Mt_4 G_4 O_4 W_4	**Sidhi**											
	Gopadbanas	4718	664	300	na							
Pd_3 W_4 $G_4/Mt_4/O_4$	**Jabalpur**											
	Sihasa	2854	608	300	132	62	7	85	35	6-4	119	52
Mt_3 Pd_4 O_4/Ba_4	**Sidhi**											
	Deosar	3768	673	150	na							
	Singrauli	1904	635	300	na							
W_3 O_4 C_4/Pu_4	**Hoshangabad**											
	Seoni Malwa	1026	450	300	131	54	7	82	30	6-4	121	47
	Sohagpur	2106	1350	345	134	56	7	83	30	6-4	123	48

APPENDIX 3 (*Contd.*)

Cropping patterns	District/ taluk	Geo-graphi-cal area (sq km)	Elevation (masl) max	Elevation (masl) min	Annual rainfall total (cm)	rd	mmr	mr	nd	* Consecutive months a	b	c
	Rainfall Zone—XI (concld.)		..		..	..	..	*Rainfall Pattern—E_4 (A_2 B_1 C_1) E_4*				
W_4 G_4 Pu_4 O_4	Hoshangabad	1786	600	300	130	57	7	84	32	6-4	109	50
W_4 Mt_4 Pd_4 G_4 O_4	**Jabalpur**											
	Jabalpur	2270	498	300	143	65	7	90	35	6-4	127	53
Pu_4 W_4 G_4 Jk_4	**Narsimhapur**											
	Gadarwara	2190	650	345	127	57	7	78	31	6-4	115	48
G_4 W_4 Pu_4 Jk_4	Narsimhapur	2286	1598	600	124	58	7	77	31	6-4	112	49
	Rainfall Zone—XII		..		..	..	..	*Rainfall Pattern E_4 (A_2 B_1 C_1) D_1 E_3*				
Pd_2 Mt_4	**Shahdol**											
	Sahagpur	5039	1127	300	131	66	7-8	77	34	6-4	113	62
Pd_2 Pu_4/Mt_4	**Balaghat**											
	Baihar	2515	833	300	156	75	7	96	39	6-4	136	60
Pd_3 Mt_4 Pu_4	**Surguja**											
	Bharatpur	2314	1026	300	———	———	———	na	———	———	———	———
Pd_3 Mt_4 Pu_4 W_4	**Mandla**											
	Mandla	3426	848	450	153	72	7	90	37	6-4	132	57
	Seoni											
	Seoni	3523	610	450	140	72	7	77	35	6-4	119	56
Mt_3 Pd_4 O_4	**Shahdol**											
	Pushparaj Garh	1764	1027	300	150	84	8	77	39	6-4	122	63
	Mandla											
	Niwas	2578	689	450	172	75	7	109	41	6-4	154	62
	Dindari	2272	970	450	149	75	7	88	39	6-4	128	60
W_4 Mt_4 Pd_4 G_4 O_4	**Seoni**											
	Lakhnadon	3084	755	450	127	64	7	70	31	6-4	107	50
	Rainfall Zone—XIII		..		..	..	..	*Rainfall Pattern—E_4 (A_2 B_2) D_1 E_3*				
Pd_1	**Raigarh**											
	Raigarh	1320	450	214	164	73	7	98	39	6-4	147	61
	Saranggarh	989	450	284	145	68	7	84	34	6-4	127	55
	Bilaspur											
	Sakti	1536	300	284	157	75	7	95	39	6-4	139	62
	Katghara	4310	989	300	160	79	7	96	41	6-4	140	64
	Raipur											
	Mahasanund	3697	734	230	155	66	8	89	34	6-4	139	55
	Bindranawa Garh	2819	929	300	———	———	———	na	———	———	———	———
	Bastar											
	Bijapur	3697	857	150	166	79	7	96	39	6-4	144	64
Pd_2 Mt_4/Pu_4	**Surguja**											
	Surguja	4617	817	300	———	———	———	na	———	———	———	———
	Ambikapur	4336	1152	300	166	76	8	101	40	6-4	145	61
	Raigarh											
	Jaspur	4569	1035	300	173	92	7	95	45	6-4	145	72
	Udaipur	1780	900	300	———	———	———	na	———	———	———	———
	Gharghoda	1488	806	300	———	———	———	na	———	———	———	———
Pd_2 Mt_4/Pu_4	**Balaghat**											
	Balaghat	2087	792	300	167	74	7	106	40	6-4	150	61
	Waraseoni	1982	587	300	156	69	7	96	37	6-4	139	57
	Raipur											
	Raipur	2895	300	285	136	64	8	76	32	6-4	119	51
	Dhamtari	2076	480	300	144	64	8	80	31	6-4	125	51

APPENDIX 3 (*Concld.*)

Cropping patterns	District/ taluk	Geo-graphi-cal area (sq km)	Elevation (masl) max	Elevation (masl) min	Annual rainfall total (cm)	rd	mmr	nr	nd	* Consecutive months a	b	c
	Rainfall Zone—XIII (concld.)	..	..	..	..	..				*Rainfall Pattern—E_4 (A_2 B_2) D_1 E_3*		
	Durg											
	Durg	3006	351	300	128	62	8-7	68	29	6-4	110	59
	Sarajari											
	Balod	3843	626	300	132	63	8	68	30	6-4	114	50
	Bastar											
	Kanker	1751	619	450	137	68	7	70	32	6-4	115	53
	Bhanu Pra-tap pur	1372	720	450	179	77	7	109	40	6-4	164	65
	Narayanpur	3140	938	300	141	76	7	76	38	6-4	121	62
	Jagdalpur	4091	1194	300	156	84	8	78	38	6-5	138	69
	Konta	1197	768	150	139	72	7	69	34	6-5	123	63
Pd_3 Mt_4 O_4	**Surguja**											
	Samri	1637	900	600	———	———	———	na	———	———	———	———
Pd_3 Mt_4 Pu_4/G_4	**Durg**											
	Rajnand-gaon	1945	351	300	133	66	8-7	71	32	6-4	114	53
Pd_2 Mt_4/Pu_4	**Bastar**											
	Kundagaon	3681	812	450	145	80	7	75	38	6-4	123	64
Pd_3 Mt_3	Dantewara	2203	1240	450	141	78	7	77	39	6-4	119	63
Mt_3 Pd_4 O_4	**Surguja**											
	Pal	3225	1225	450	———	———	———	na	———	———	———	———

सत्यमेव जयते

APPENDIX 4

Area under Principal Crops

MADHYA PRADESH

(000' ha)

District/taluk	Gross cropped area	Pd	Jk	Jr	B	M	R	W	Ba	Mt	G	T	Pu	S	Gn	O	C	L	F	Misc.
	Rainfall Zone—I	..		..		..		..		..		..		..		*Rainfall Pattern—E_4 (C_4) E_4*				
Khargone (West Nimar)																				
Barwani	48	—	12 (26)	0·2 (1)	6 (12)	3 (2)	— (—)	2 (4)	— (—)	1 (1)	1 (1)	0·4 (1)	10 (12)	0·1 (0·2)	7 (15)	1 (1)	4 (8)	— (—)	— (—)	0·3 (1)
Rajpur	87	1 (1)	23 (26)	0·1 (0·1)	8 (10)	6 (7)	— (—)	6 (7)	— (—)	0·3 (0·4)	1 (1)	3 (3)	15 (17)	0·4 (1)	10 (11)	— (—)	10 (11)	— (—)	0·4 (1)	3 (3)
Dhar																				
Manawar	144	3 (2)	41 (29)	0·4 (0·3)	4 (3)	15 (11)	— (—)	12 (8)	— (—)	0·3 (0·2)	5 (3)	5 (3)	18 (13)	0·4 (0·3)	19 (13)	1 (1)	16 (11)	— (—)	2 (1)	2 (1)
Khandwa																				
Burhanpur	104	4 (4)	21 (20)	— (—)	1 (1)	0·4 (0·3)	— (—)	3 (3)	— (—)	2 (2)	1 (1)	5 (4)	10 (10)	0·4 (0·4)	2 (2)	1 (1)	50 (48)	— (—)	— (—)	3 (3)
	Rainfall Zone—II	..		..		..		..		..		..		..		*Rainfall Pattern—E_4 (B_1 C_3) E_4*				
Khandwa																				
Burhanpur	104	4 (4)	21 (20)	— (—)	1 (1)	0·4 (0·3)	— (—)	3 (3)	— (—)	2 (2)	1 (1)	5 (4)	10 (10)	0·4 (0·4)	2 (2)	1 (1)	50 (48)	— (—)	— (—)	3 (3)
Khandwa	224	8 (4)	75 (33)	— (—)	5 (2)	1 (0·3)	— (—)	8 (4)	— (—)	2 (1)	2 (1)	7 (3)	35 (15)	1 (0·2)	12 (5)	1 (1)	62 (28)	— (—)	3 (1)	2 (1)
Khargone																				
Khargone	135	3 (3)	44 (32)	0·2 (0·1)	15 (11)	5 (4)	— (—)	6 (4)	— (—)	1 (1)	1 (1)	4 (3)	20 (15)	0·3 (0·2)	10 (7)	— (—)	25 (18)	— (—)	1 (0·4)	— (—)
Kasrawad	61	1 (1)	21 (35)	— (—)	6 (7)	2 (4)	— (—)	5 (8)	— (—)	— (—)	0·4 (1)	4 (7)	4 (6)	0·2 (0·3)	4 (6)	0·1 (0·2)	13 (21)	— (—)	1 (2)	— (—)
Sendhwa	102	4 (4)	26 (25)	6 (6)	7 (7)	5 (5)	— (—)	4 (4)	— (—)	2 (2)	2 (2)	1 (1)	33 (32)	0·2 (0·2)	6 (6)	— (—)	6 (6)	— (—)	0·1 (0·1)	— (—)
Bhikangaon	102	3 (3)	34 (33)	— (—)	6 (6)	3 (3)	— (—)	3 (3)	— (—)	0·4 (0·3)	1 (1)	4 (3)	16 (16)	0·1 (0·1)	5 (5)	0·4 (0·3)	24 (24)	— (—)	1 (1)	2 (1)
Maheshwar	45	0·1 (0·2)	13 (28)	— (—)	1 (2)	3 (7)	— (—)	4 (9)	— (—)	— (—)	0·4 (1)	2 (5)	2 (4)	0·4 (1)	6 (13)	0·2 (—)	12 (27)	— (—)	1 (2)	1 (1)
Barwaha	74	1 (1)	17 (23)	— (—)	2 (2)	2 (2)	— (—)	6 (8)	— (—)	— (—)	1 (1)	3 (5)	8 (11)	0·2 (0·3)	5 (6)	0·2 (0·3)	25 (34)	— (—)	3 (5)	1 (1)

Pd = paddy
Jk = jowar kharif
Jr = jowar rabi
B = bajra
M = maize
R = ragi
W = wheat
Ba = barley
Mt = small millets
G = gram
T = tur
Pu = other pulses
S = sugarcane
Gn = groundnut
O = other oilseeds
C = cotton
L = plantations
F = fodder
Misc. = miscellaneous crops

NOTE : The percentage figures have been rounded off individually and hence cross totals may not, in some cases, add upto 100.

APPENDIX 4 (*Contd.*)

(000' ha)

District/ taluk	Gross cropped area	Pd	Jk	Jr	B	M	R	W	Ba	Mt	G	T	Pu	S	Gn	O	C	L	F	Misc.
	Rainfall Zone—III	..		..		..		..		..		..		..	*Rainfall Pattern—E_4 (B_2 C_1 E_1) E_4*					
Bhind																				
Gohad	85	9 (11)	6 (8)	— (—)	1 (1)	— (—)	— (—)	27 (32)	1 (1)	— (—)	25 (29)	2 (2)	4 (5)	0·4 (1)	— (—)	7 (8)	— (—)	— (—)	1 (1)	2 (2)
Gwalior																				
Pichhore	127	16 (12)	16 (12)	— (—)	0·1 (0·1)	— (—)	— (—)	46 (36)	1 (1)	— (—)	20 (16)	5 (4)	9 (7)	3 (2)	— (—)	10 (8)	— (—)	— (—)	2 (2)	— (—)
Bhander	54	0·2 (0·3)	7 (13)	— (—)	0·1 (0·3)	— (—)	— (—)	19 (36)	1 (2)	— (—)	17 (32)	3 (4)	2 (3)	— (—)	— (—)	5 (8)	— (—)	— (—)	0·3 (1)	— (—)
Datia																				
Seondhar	65	0·1 (0·1)	7 (11)	— (—)	1 (2)	— (—)	— (—)	24 (37)	1 (1)	— (—)	20 (32)	2 (3)	2 (3)	0·2 (0·3)	— (—)	6 (10)	— (—)	— (—)	2 (0·3)	— (—)
Datia	66	1 (2)	9 (14)	— (—)	0·1 (0·1)	1 (2)	— (—)	23 (34)	1 (2)	1 (1)	16 (24)	2 (3)	5 (7)	0·2 (0·3)	— (—)	6 (9)	— (—)	— (—)	0·4 (1)	— (—)
Morena																				
Sheopur	103	— (—)	28 (27)	— (—)	4 (4)	0·2 (0·2)	— (—)	30 (29)	1 (1)	— (—)	17 (17)	2 (2)	4 (4)	0·1 (0·1)	— (—)	13 (12)	— (—)	— (—)	2 (2)	2 (2)
Shivpuri																				
Shivpuri	42	1 (2)	11 (25)	— (—)	0·3 (0·1)	1 (3)	— (—)	16 (38)	0·3 (1)	0·1 (0·3)	2 (6)	0·2 (1)	2 (5)	0·4 (1)	1 (2)	3 (8)	— (—)	— (—)	3 (6)	1 (1)
Gwalior																				
Gwalior	78	5 (6)	13 (17)	— (—)	3 (4)	0·1 (0·2)	— (—)	21 (27)	0·4 (1)	— (—)	15 (20)	3 (4)	2 (3)	0·4 (1)	— (—)	8 (10)	— (—)	— (—)	3 (4)	2 (3)
Shivpuri																				
Karera	78	3 (4)	15 (19)	— (—)	0·1 (0·2)	5 (7)	— (—)	21 (27)	3 (4)	4 (5)	11 (15)	0·2 (0·2)	5 (6)	2 (2)	0·3 (0·3)	6 (8)	— (—)	— (—)	1 (1)	2 (2)
Pohri	55	0·3 (1)	12 (22)	— (—)	4 (8)	1 (2)	— (—)	13 (24)	0·3 (1)	1 (1)	3 (6)	1 (1)	3 (6)	0·4 (1)	2 (4)	5 (9)	— (—)	— (—)	7 (13)	1 (1)
Pichhore	93	5 (5)	12 (13)	— (—)	— (—)	10 (11)	— (—)	14 (15)	6 (7)	13 (14)	3 (3)	— (—)	10 (11)	0·4 (0·4)	— (—)	9 (9)	— (—)	— (—)	10 (11)	1 (1)
Mandsaur																				
Bhanpura	41	— (—)	19 (48)	— (—)	0·3 (1)	3 (8)	— (—)	4 (11)	0·3 (1)	— (—)	1 (4)	0·1 (0·3)	5 (12)	— (—)	1 (2)	1 (3)	1 (1)	— (—)	2 (4)	2 (4)
Shajapur																				
Susner	74	1 (2)	28 (38)	— (—)	— (—)	6 (8)	— (—)	4 (5)	0·2 (0·3)	— (—)	2 (3)	2 (2)	2 (3)	4 (1)	8 (10)	0·4 (1)	18 (24)	— (—)	0·2 (0·3)	2 (3)
Ratlam																				
Jaora	40	0·1 (0·1)	27 (25)	— (—)	2 (2)	6 (6)	— (—)	17 (15)	0·1 (0·1)	— (—)	9 (8)	2 (2)	9 (8)	2 (2)	9 (8)	1 (1)	6 (6)	— (—)	13 (12)	6 (6)
Ratlam																				
Alot	68	— (—)	24 (35)	— (—)	6 (9)	4 (5)	— (—)	7 (10)	0·2 (0·2)	— (—)	3 (4)	1 (2)	4 (6)	0·4 (1)	1 (2)	1 (2)	8 (12)	— (—)	8 (12)	— (—)
Shivpuri																				
Kolaras	99	0·2 (0·2)	32 (32)	— (—)	0·3 (0·3)	3 (3)	— (—)	25 (26)	0·4 (1)	0·2 (0·2)	10 (10)	— (—)	4 (4)	0·4 (0·4)	1 (1)	7 (7)	— (—)	— (—)	13 (13)	2 (2)

Mandsaur																				
Manasa	73	0·1 (0·1)	24 (34)	— (—)	0·1 (0·1)	7 (10)	— (—)	7 (10)	0·1 (0·2)	— (—)	4 (5)	1 (2)	10 (14)	0·1 (0·1)	4 (6)	2 (2)	— (—)	— (—)	8 (12)	5 (6)
Malhargarh	66	— (—)	23 (34)	— (—)	1 (2)	5 (7)	— (—)	6 (9)	0·1 (0·1)	— (—)	3 (5)	1 (2)	8 (12)	0·2 (0·2)	8 (12)	0·4 (1)	0·4 (1)	— (—)	8 (11)	7 (7)
Mandsaur	104	0·1 (0·1)	30 (29)	— (—)	0·2 (0·2)	7 (7)	— (—)	9 (8)	0·1 (0·1)	— (—)	5 (5)	2 (2)	10 (10)	1 (1)	18 (17)	0·4 (0·3)	2 (2)	— (—)	13 (12)	7 (7)
Neemuch	69	0·1 (0·1)	17 (25)	— (—)	— (—)	5 (8)	— (—)	10 (14)	0·1 (0·1)	— (—)	3 (5)	1 (1)	11 (15)	0·1 (0·2)	10 (15)	1 (1)	— (—)	— (—)	7 (11)	4 (5)
Garoth	77	0·1 (0·1)	32 (41)	— (—)	1 (1)	6 (8)	— (—)	4 (6)	0·2 (0·3)	— (—)	4 (5)	1 (1)	8 (10)	0·1 (0·1)	5 (6)	1 (1)	5 (6)	— (—)	8 (11)	2 (3)
Sitaman	88	0·1 (0·2)	33 (37)	— (—)	3 (3)	6 (7)	— (—)	5 (6)	0·2 (0·3)	— (—)	3 (3)	2 (2)	5 (6)	0·2 (0·2)	8 (9)	1 (1)	6 (7)	— (—)	13 (15)	3 (3)
Morena																				
Jaura	75	0·1 (0·2)	4 (5)	— (—)	16 (22)	0·1 (0·2)	— (—)	7 (9)	1 (1)	— (—)	16 (22)	7 (10)	5 (7)	1 (1)	0·1 (0·1)	14 (18)	— (—)	— (—)	1 (2)	3 (3)
Sabalgarh	61	0·2 (0·3)	1 (2)	— (—)	16 (26)	— (—)	— (—)	11 (18)	0·2 (0·3)	— (—)	16 (26)	6 (10)	2 (3)	1 (2)	— (—)	6 (9)	— (—)	— (—)	1 (2)	1 (2)
Bijeypur	37	0·1 (0·3)	2 (5)	— (—)	15 (40)	0·3 (1)	— (—)	5 (13)	0·2 (1)	— (—)	5 (13)	2 (4)	0·4 (1)	1 (2)	0·4 (1)	7 (18)	— (—)	— (—)	0·4 (1)	— (—)
Mandsaur																				
Jawad	57	— (—)	7 (12)	— (—)	— (—)	10 (18)	— (—)	8 (13)	1 (1)	— (—)	2 (3)	1 (1)	5 (9)	0·4 (1)	7 (12)	1 (2)	1 (1)	— (—)	11 (20)	3 (6)
Bhind																				
Mehgaon	80	4 (5)	7 (8)	— (—)	5 (6)	— (—)	— (—)	18 (23)	3 (4)	— (—)	21 (26)	5 (6)	7 (8)	0·2 (0·2)	— (—)	11 (14)	— (—)	— (—)	0·2 (0·2)	— (—)
Lohar	84	— (—)	5 (6)	— (—)	11 (13)	— (—)	— (—)	14 (17)	6 (7)	— (—)	27 (33)	7 (9)	3 (4)	0·1 (0·1)	— (—)	9 (11)	— (—)	— (—)	0·2 (0·2)	1 (1)
Bhind	94	— (—)	8 (8)	— (—)	20 (22)	— (—)	— (—)	10 (11)	10 (11)	— (—)	24 (25)	7 (7)	3 (4)	0·1 (0·1)	— (—)	12 (12)	— (—)	— (—)	0·1 (0·1)	— (—)
Morena																				
Morena	72	2 (3)	5 (7)	— (—)	11 (15)	— (—)	— (—)	11 (15)	1 (1)	— (—)	15 (20)	6 (8)	4 (5)	0·1 (0·2)	— (—)	17 (24)	— (—)	— (—)	1 (1)	— (—)
Ambah	74	— (—)	7 (9)	— (—)	11 (15)	— (—)	— (—)	8 (11)	2 (3)	— (—)	17 (23)	7 (10)	5 (6)	0·2 (0·3)	— (—)	16 (22)	— (—)	— (—)	1 (1)	— (—)
	Rainfall Zone—IV .. .. *Rainfall Pattern—E_4 (B_2 C_2) E_4*																			
Indore																				
Indore	70	0·1 (0·2)	12 (17)	—	0·1 (0·1)	2 (3)	— (—)	22 (32)	— (—)	— (—)	9 (13)	4 (6)	3 (5)	1 (2)	2 (2)	1 (1)	2 (2)	—	8 (11)	4 (6)
Depalpur	86	— (—)	12 (14)	— (—)	0·1 (0·1)	1 (1)	— (—)	30 (35)	— (—)	— (—)	15 (18)	4 (5)	6 (7)	1 (1)	0·1 (0·1)	5 (6)	2 (3)	— (—)	8 (10)	— (—)
Samir	64	— (—)	13 (20)	— (—)	0·4 (1)	1 (1)	— (—)	24 (37)	— (—)	— (—)	9 (14)	5 (8)	4 (6)	0·4 (1)	0·4 (1)	2 (2)	1 (2)	— (—)	5 (7)	— (—)
Ujjain																				
Badnagar	105	— (—)	17 (16)	— (—)	— (—)	1 (1)	— (—)	36 (35)	0·1 (0·1)	— (—)	16 (15)	5 (5)	7 (7)	0·4 (0·4)	1 (1)	5 (5)	6 (6)	— (—)	8 (8)	2 (2)

APPENDIX 4 (*Contd.*)

(000' ha)

District/taluk	Gross cropped area	Pd	Jk	Jr	B	M	R	W	Ba	Mt	G	T	Pu	S	Gn	O	C	L	F	Misc.
	Rainfall Zone—IV (contd.)					..			..		..			..		*Rainfall Pattern—* $E_4(B_2C_2)E_4$				
Ratlam																				
Ratlam	98	1 (1)	12 (12)	— (—)	0·7 (0·1)	8 (8)	— (—)	20 (20)	0·1 (0·1)	0·1 (0·1)	13 (13)	2 (2)	9 (9)	1 (1)	6 (6)	1 (1)	9 (9)	— (—)	1 (1)	1 (1)
Dhar																				
Dhar	121	1 (1)	15 (12)	— (—)	— (—)	6 (5)	— (—)	36 (29)	—	0·1 (0·1)	20 (17)	3 (2)	12 (10)	0·4 (0·3)	2 (2)	7 (5)	3 (3)	— (—)	13 (11)	2 (2)
Badnawar	80	1 (1)	5 (6)	— (—)	— (—)	3 (4)	— (—)	22 (27)	0·1 (0·1)	0·1 (0·1)	16 (19)	1 (1)	7 (9)	0·4 (1)	6 (7)	3 (4)	7 (9)	— (—)	8 (10)	— (—)
Jhabua																				
Jhabua	82	6 (7)	10 (12)	— (—)	0·1 (0·1)	28 (34)	— (—)	2 (2)	0·1 (0·2)	12 (14)	5 (6)	1 (2)	4 (5)	— (—)	4 (5)	2 (2)	5 (6)	— (—)	4 (5)	— (—)
Thandla	52	4 (8)	6 (11)	— (—)	0·1 (0·1)	16 (31)	— (—)	2 (3)	0·1 (0·2)	2 (3)	4 (8)	1 (2)	2 (3)	— (—)	4 (7)	1 (2)	9 (16)	— (—)	3 (5)	— (—)
Ratlam																				
Sailana	50	2 (4)	9 (18)	— (—)	— (—)	10 (20)	— (—)	3 (5)	— (—)	4 (9)	2 (5)	0·2 (0·4)	2 (4)	0·1 (0·1)	2 (5)	1 (2)	8 (10)	— (—)	5 (10)	1 (2)
Ujjain																				
Khacharod	101	—	26 (26)	— (—)	1 (1)	4 (4)	— (—)	19 (19)	— (—)	— (—)	8 (8)	2 (2)	9 (9)	1 (1)	4 (4)	1 (1)	12 (12)	— (—)	11 (11)	2 (2)
Mahidpur	87	— (—)	28 (33)	— (—)	3 (3)	2 (2)	— (—)	12 (14)	0·1 (0·1)	— (—)	5 (6)	3 (3)	2 (3)	1 (1)	2 (2)	1 (1)	5 (17)	— (—)	13 (15)	— (—)
Tarana	77	0·1 (0·2)	24 (32)	— (—)	0·1 (0·1)	1 (1)	— (—)	12 (15)	— (—)	— (—)	4 (5)	2 (3)	4 (5)	1 (1)	6 (8)	1 (1)	11 (14)	— (—)	11 (14)	— (—)
Dhar																				
Kukshi	102	1 (0·4)	20 (20)	1 (0·4)	9 (9)	16 (16)	— (—)	7 (7)	— (—)	2 (2)	3 (3)	2 (2)	16 (16)	0·1 (0·1)	14 (14)	1 (0·4)	9 (9)	— (—)	1 (0·4)	— (—)
Dewas																				
Dewas	90	0·2 (0·2)	20 (23)	— (—)	0·2 (0·2)	1 (1)	— (—)		— (—)	— (—)	8 (9)	4 (5)	4 (4)	1 (1)	3 (4)	2 (2)	3 (4)	— (—)	10 (11)	12 (13)
Ujjain																				
Ujjain	108	0·1 (0·1)	35 (33)	— (—)	1 (1)	1 (1)	— (—)	26 (24)	— (—)	— (—)	9 (9)	5 (5)	4 (3)	1 (1)	2 (2)	2 (2)	10 (9)	— (—)	11 (10)	— (—)
Indore																				
Mhow	50	0·3 (1)	9 (18)	— (—)	— (—)	3 (6)	— (—)	8 (15)	— (—)	— (—)	4 (8)	2 (5)	3 (6)	1 (2)	1 (2)	1 (2)	3 (6)	— (—)	12 (24)	2 (5)
Dhar																				
Sardarpur	80	5 (6)	5 (6)	— (—)	— (—)	6 (8)	— (—)	8 (10)	— (—)	1 (1)	9 (11)	1 (1)	9 (11)	1 (1)	12 (14)	0·4 (1)	13 (16)	— (—)	10 (13)	— (—)
Jhabua																				
Petlawad	53	4 (8)	3 (5)	— (—)	— (—)	6 (11)	— (—)	2 (3)	0·1 (0·2)	1 (2)	3 (6)	0·2 (0·4)	9 (18)	0·1 (0·2)	6 (12)	1 (1)	10 (19)	— (—)	6 (12)	2 (3)
Alirajpur	93	3 (3)	11 (12)	1 (1)	12 (13)	10 (10)	— (—)	1 (1)	— (—)	21 (23)	1 (1)	1 (1)	23 (25)	— (—)	6 (7)	1 (1)	1 (1)	— (—)	— (—)	1 (1)
Johat	73	3 (4)	11 (14)	0·2 (0·3)	4 (5)	14 (20)	— (—)	1 (1)	— (—)	16 (23)	3 (4)	1 (2)	15 (20)	— (—)	2 (3)	1 (1)	1 (1)	— (—)	— (—)	1 (1)

Rainfall Zone—V .. .. *Rainfall Pattern—E_4 (A_1 B_1 C_1 E_1) E_4*

Shaja pur																			
Shajapur	108	1 (1)	41 (38)	— (—)	— (—)	2 (2)	— (—)	13 (12)	— (—)	— (—)	5 (5)	3 (3)	3 (3)	1 (1)	14 (13)	1 (1)	20 (19)	— (—)	0·2 (0·2)	3 (3)
Agar	74	0·3 (0·4)	32 (43)	— (—)	1 (1)	4 (6)	— (—)	4 (6)	0·2 (0·2)	— (—)	2 (3)	3 (4)	3 (4)	0·4 (0·4)	2 (2)	1 (1)	22 (28)	— (—)	— (—)	1 (1)
Rajgarh																			
Rajgarh	64	1 (2)	24 (38)	— (—)	— (—)	6 (9)	— (—)	3 (4)	— (—)	— (—)	2 (3)	2 (3)	1 (2)	0·1 (0·2)	5 (7)	1 (2)	6 (9)	— (—)	12 (19)	1 (2)
Khilchipur	109	1 (1)	39 (35)	— (—)	— (—)	10 (9)	— (—)	5 (5)	1 (1)	0·1 (0·1)	3 (3)	3 (2)	2 (2)	0·4 (0·4)	9 (9)	2 (2)	16 (15)	— (—)	16 (15)	2 (2)
Sarangpur	71	1 (2)	24 (34)	— (—)	— (—)	1 (2)	— (—)	8 (11)	— (—)	— (—)	3 (4)	1 (2)	2 (3)	0·4 (1)	6 (9)	0·3 (0·3)	12 (17)	— (—)	10 (14)	1 (2)
Guna																			
Mungaoli	106	1 (1)	23 (22)	— (—)	— (—)	4 (4)	— (—)	45 (42)	0·3 (0·3)	1 (1)	11 (10)	— (—)	4 (4)	0·1 (0·1)	0·3 (0·3)	11 (10)	— (—)	— (—)	4 (4)	1 (1)

Rainfall Zone—VI .. .. *Rainfall Pattern—$E_4(A_1B_1C_2)E_4$*

Dewas																			
Kammed	70	1 (1)	22 (31)	— (—)	0·4 (1)	3 (4)	— (—)	5 (8)	— (—)	— (—)	2 (3)	4 (6)	1 (2)	— (0·1)	0·1 (0·1)	2 (2)	21 (30)	— (—)	6 (9)	2 (2)
Chhindwara																			
Sauser	132	4 (3)	64 (49)	1 (0·4)	0·2 (0·1)	1 (1)	— (—)	6 (5)	— (—)	5 (4)	3 (2)	12 (9)	3 (2)	0·3 (0·1)	16 (12)	3 (2)	9 (7)	— (—)	— (—)	5 (4)
Chindwara	211	7 (3)	48 (23)	— (—)	— (—)	11 (5)	0·2 (0·1)	26 (12)	— (—)	47 (22)	21 (10)	6 (3)	11 (5)	1 (1)	5 (2)	23 (11)	— (—)	— (—)	0·2 (0·1)	5 (2)
Amarwara	166	7 (4)	26 (16)	— (—)	— (—)	5 (3)	— (—)	27 (16)	— (—)	37 (21)	15 (9)	3 (2)	16 (10)	1 (1)	5 (3)	23 (14)	— (—)	— (—)	0·3 (0·1)	1 (1)
Betul																			
Multai	174	14 (8)	39 (23)	— (—)	— (—)	4 (3)	— (—)	30 (17)	— (—)	19 (11)	13 (7)	12 (7)	15 (9)	2 (1)	9 (5)	10 (6)	1 (0·3)	— (—)	4 (2)	2 (1)
Bhainshdebi	125	6 (5)	34 (28)	— (—)	— (—)	0·2 (0·2)	3 (2)	0·2 (0·2)	10 (8)	— (—)	21 (17)	7 (5)	15 (12)	11 (9)	0·3 (0·2)	7 (6)	6 (5)	2 (2)	— (—)	0·1 (0·1)
Dewas																			
Bagli	68	1 (1)	18 (27)	— (—)	0·1 (0·1)	1 (2)	— (—)	5 (7)	— (—)	0·1 (0·1)	3 (4)	4 (5)	3 (4)	1 (2)	2 (3)	1 (1)	12 (18)	— (—)	11 (16)	6 (9)
Sankateh	86	1 (1)	26 (30)	— (—)	— (—)	1 (1)	— (—)	13 (15)	— (—)	— (—)	5 (6)	4 (5)	3 (4)	1 (1)	5 (6)	1 (1)	12 (14)	— (—)	14 (16)	— (—)
Betul																			
Betul	125	4 (3)	14 (11)	— (—)	— (—)	6 (5)	— (—)	22 (17)	— (—)	40 (32)	17 (14)	6 (5)	7 (6)	1 (1)	1 (1)	5 (4)	— (—)	— (—)	1 (1)	— (—)
Dewas																			
Khategaon	56	0·3 (0·4)	12 (22)	1 (2)	— (—)	1 (1)	— (—)	17 (31)	— (0·1)	— (—)	2 (4)	3 (5)	1 (2)	— (—)	— (—)	2 (4)	12 (22)	— (—)	3 (6)	— (—)
Sehore																			
Ashta	92	2 (2)	21 (22)	— (—)	— (—)	1 (1)	— (—)	29 (31)	— (—)	— (—)	6 (7)	4 (4)	3 (3)	1 (2)	1 (1)	0·4 (0·4)	5 (6)	— (—)	18 (20)	1 (1)
Hoshangabad																			
Harda	160	3 (2)	10 (6)	4 (2)	— (—)	1 (1)	— (—)	59 (36)	0·2 (0·1)	3 (2)	6 (4)	5 (3)	7 (5)	— (—)	0·2 (0·1)	17 (11)	32 (20)	— (—)	11 (7)	2 (1)
Khargaon																			
Harsud	115	18 (16)	22 (19)	0·1 (0·1)	0·1 (0·1)	1 (1)	— (—)	11 (9)	— (—)	13 (11)	3 (3)	2 (2)	10 (9)	0·1 (0·1)	4 (3)	4 (4)	26 (22)	— (—)	1 (1)	— (—)

APPENDIX 4 (*Contd.*)

('000 ha)

District/taluk	Gross cropped area	Pd	Jk	Jr	B	M	R	W	Ba	Mt	G	T	Pu	S	Gn	O	C	L	F	Misc.
	Rainfall Zone—VII					..		..			..			..	*Rainfall Pattern—E_4 ($A_1B_1C_2$) D_1E_3*					
Durg																				
Khaigarh	184	60	—	—	—	0·3	—	11	—	43	5	8	30	—	—	25	—	—	—	2
		(33)	(—)	(—)	(—)	(0·2)	(—)	(6)	(—)	(24)	(3)	(4)	(16)	(—)	(—)	(13)	(—)	(—)	(—)	(1)
Kawardha	140	40	—	—	—	1	—	8	—	36	19	7	15	1	—	11	—	—	—	2
		(29)	(—)	(—)	(—)	(1)	(—)	(6)	(—)	(26)	(13)	(5)	(11)	(0·5)	(—)	(8)	(—)	(—)	(—)	(1)
	Rainfall Zone—VIII					..		..			..				*Rainfall Pattern—E_4 ($A_1C_1E_1$) E_4*					
Chhatarpur																				
Laundi	103	1	11	—	0·2	—	—	33	4	2	29	5	4	0·1	—	10	—	—	1	2
		(1)	(11)	(—)	(0·2)	(—)	(—)	(33)	(4)	(2)	(28)	(5)	(4)	(0·1)	(—)	(10)	(—)	(—)	(1)	(2)
Panna																				
Panna	95	14	3	—	—	0·2	—	33	2	9	10	1	2	0·1	—	21	—	—	—	—
		(15)	(3)	(—)	(—)	(0·2)	(—)	(34)	(2)	(9)	(10)	(1)	(3)	(0·1)	(—)	(22)	(—)	(—)	(—)	(—)
Satna																				
Nagad	87	18	1	—	—	0·2	—	35	3	6	9	2	2	—	—	9	—	—	—	2
		(21)	(1)	(—)	(—)	(0·2)	(—)	(4)	(3)	(7)	(10)	(2)	(2)	(—)	(—)	(11)	(—)	(—)	(—)	(2)
Timgarh																				
Tikamgarh	104	16	6	—	—	—	—	23	7	24	3	—	7	1	—	6	—	—	11	—
		(16)	(6)	(—)	(—)	(—)	(—)	(22)	(6)	(23)	(3)	(—)	(6)	(	(—)	(6)	(—)	(—)	(1	(—)
Jatara	98	5	25	—	—	0·2	—	20	3	10	7	1	7	1	—	8	—	—	10	—
		(6)	(25)	(—)	(—)	(0·3)	(—)	(21)	(3)	(10)	(7)	(1)	(7)	(1)	(—)	(8)	(—)	(—)	(10)	(—)
Niwan	62	3	10	—	—	1	—	19	1	5	6	0·4	4	0·3	—	2	—	—	9	1
		(4)	(16)	(—)	(—)	(2)	(—)	(31)	(2)	(8)	(9)	(1)	(6)	(1)	(—)	(4)	(—)	(—		(2)
Chhatarpur																				
Chhatarpur	152	6	11	—	—	—	—	28	20	27	10	2	9	0·3	—	22	—	—	16	1
		(4)	(7)	(—)	(—)	(—)	(—)	(19)	(13)	(18)	(6)	(1	·)	(0·2)	(—)	(14)	(—)	(—)	(11)	(1)
Bijawar	96	10	3	—	—	0·4	—	22	8	19	7	0·1	5	0·3	—	8	—	—	12	1
		(10)	(3)	(—)	(—)	(1)	(—)	(23)	(9)	(20)	(7)	(0·1)	(6)	(0·3)	(—)	(8)	(—)	(—)	(12)	(1)
Rewa																				
Sirmaur	104	16	3	—	—	—	—	25	2	23	11	4	5	—	—	12	—	—	0·2	5
		(15)	(3)	(—)	(—)	(—)	(—)	(24)	(2)	(22)	(11)	(3)	(5)			(12)				(5)
Huzur	102	18	3	—	—	—	—	31	1	19	12	3	5	—	—	9	—	—	1	—
		(17)	(3)	(—)	(—)	(—)	(—)	(30)	(1)	(18)	(12)	(3)	(5)	(—)	(—)	(9)	(—)	(—)	(1)	(—)
Manganj	133	39	2	—	—	1	—	26	2	26	12	4	4	—	—	16	—	—	—	—
		(29)	(1)	(—)	(—)	(1)	(—)	(20)	(2)	(20)	(9)	(3)	(3)	(—)	(—)	(12)	(—)	(—)	(—)	(—)
Teonthar	95	21	10	—	3	—	—	12	8	6	17	5	5	—	—	8	—	—	0·1	—
		(21)	(11)	(—)	(3)	(—)	(—)	(13)	(9)	(6)	(17)	(5)	(5)	(—)	(—)	(9)	(—)	(—)	(0·1)	(—)
Panna																				
Ajargarh	27	1	3	—	—	—	—	4	3	1	8	2	1	0·1	—	3	—	—	—	—
		(6)	(10)	(—)	(—)	(—)	(—)	(16)	(13)	(4)	(29)	(6)	(2)	(0·4)	(—)	(13)	(—)	(—)	(—)	(—)
	Rainfall Zone—IX				..		..		..			..			*Rainfall Pattern—E_4 (A_2C_2) E_4*					
Sagar																				
Khurai		-	7	—	—	2	—	102	0·4	1	14	1	4	—	—	6	—	—	15	1
		1)	(5)	(—)	(—)	(1)	(—)	(65)	(0·3)	(1)	(9)	(0·4)	(3)	(—)	(—)	(4)	(—)	(—)	(10)	(1)
Sagar	155	2	8	—	—	1	—	80	0·1	1	8	1	17	0·1	1	9	—	—	26	1
		(1)	(5)	(—)	(—)	(1)	(—)	(51)	(0·1)	(1)	(5)	(1)	(11)	(0·1)	(1)	(5)	(—)	(—)	(17)	(1)

Raisen																					
Ghairatganj	43	1 (1)	0·3 (1)	— (—)	— (—)	0·2 (0·2)	— (—)	22 (51)	— (—)	0·1 (0·1)	9 (22)	0·1 (0·1)	4 (10)	— (—)	— (—)	2 (4)	— (—)	— (—)	5 (11)	— (—)
Gobarganj	51	2 (4)	0·2 (0·3)	— (—)	— (—)	0·4 (1)	— (—)	29 (56)	— (—)	0·1 (0·1)	5 (10)	— (—)	7 (13)	0·1 (0·2)	— (—)	1 (1)	— (—)	— (—)	7 (14)	— (—)
Raisen	57	1 (2)	1 (3)	— (—)	— (—)	1 (1)	— (—)	34 (60)	— (—)	— (—)	8 (13)	0·1 (0·1)	4 (7)	— (—)	0·2 (0·3)	— (2)	1 (—)	— (—)	6 (11)	1 (1)
Vidisha																					
Vidisha	143	0·4 (0·3)	7 (4)	— (—)	— (—)	1 (1)	— (—)	82 (57)	0·1 (0·1)	0·2 (0·1)	28 (20)	1 (1)	10 (7)	0·1 (0·1)	0·1 (0·1)	2 (2)	— (—)	— (—)	9 (6)	2 (2)
Basoda	157	0·4 (0·2)	16 (10)	— (—)	— (—)	2 (1)	— (—)	80 (51)	0·2 (0·1)	0·3 (0·2)	25 (16)	2 (2)	8 (5)	0·3 (0·2)	0·3 (0·2)	7 (5)	— (—)	— (—)	14 (9)	2 (1)
Karwai	64	0·3 (0·4)	7 (11)	— (—)	— (—)	1 (1)	— (—)	36 (57)	0·1 (0·2)	0·1 (0·2)	8 (12)	1 (1)	3 (5)	— (—)	0·1 (0·1)	4 (6)	— (—)	— (—)	4 (6)	— (—)
Sagar																					
Banda	73	4 (5)	4 (5)	— (—)	— (—)	1 (1)	— (—)	34 (46)	0·3 (0·3)	5 (7)	2 (3)	1 (1)	6 (8)	— (—)	1 (2)	5 (7)	— (—)	— (—)	10 (14)	— (—)
Rehli	141	6 (4)	8 (6)	— (—)	— (—)	1 (1)	— (—)	58 (41)	— (—)	6 (4)	11 (8)	2 (1)	17 (12)	0·2 (0·1)	4 (3)	8 (5)	— (—)	— (—)	9 14)	1 (1)
Damoh																					
Damoh	176	40 (23)	7 (4)	— (—)	— (—)	1 (1)	— (—)	78 (43)	— (—)	8 (5)	13 (7)	1 (1)	9 (5)	— (—)	1 (1)	7 (4)	— (—)	— (—)	8 (5)	3 (2)
Raisen																					
Baraily	86	0·2 (0·3)	7 (8)	— (—)	— (—)	0·1 (0·1)	— (—)	30 (35)	— (—)	0·3 (0·3)	15 (18)	2 (2)	18 (21)	— (0·1)	— (—)	7 (8)	— (—)	— (—)	5 (5)	— (—)
Silwani	44	0·4 (1)	1 (2)	— (—)	— (—)	0·2 (0·4)	— (—)	16 (37)	— (—)	1 (3)	10 (23)	0·4 (1)	8 (18)	— (0·1)	— (0·1)	2 (4)	— (—)	— (—)	5 (10)	— (—)
Begamganj	50	1 (2)	1 (2)	— (—)	— (—)	0·3 (1)	— (—)	22 (44)	— (—)	0·4 (1)	10 (20)	0·1 (0·2)	6 (12)	— (0·1)	— (0·1)	3 (6)	— (—)	— (—)	6 (11)	— (—)
Sehore																					
Budni	44	0·3 (1)	2 (4)	— (—)	— (0·1)	0·1 (0·3)	— (—)	22 (50)	— (—)	0·4 (1)	4 (10)	2 (4)	7 (15)	— (—)	— (—)	4 (10)	0·2 (0·4)	— (—)	2 (4)	— (—)
Guna																					
Guna	100	0·4 (0·4)	30 (30)	— (—)	0·4 (0·4)	5 (5)	— (—)	35 (35)	0·1 (0·1)	0·1 (0·1)	8 (8)	0·1 (0·1)	5 (5)	0·4 (0·4)	0·1 (0·1)	7 (7)	— (—)	— (—)	6 (6)	3 (3)
Ashoknagar	156	0·1 (0·1)	38 (25)	— (—)	— (—)	3 (2)	— (—)	53 (34)	— (—)	— (—)	22 (14)	1 (1)	6 (4)	0·4 (0·2)	0·1 (0·1)	10 (7)	— (—)	— (—)	16 (10)	6 (4)
Vidisha																					
Sironj	84	— (—)	14 (17)	— (—)	— (—)	2 (2)	— (—)	35 (42)	— (—)	— (—)	10 (12)	1 (1)	3 (4)	— (—)	0·2 (0·2)	7 (9)	— (—)	— (—)	10 (12)	1 (1)
Latur	51	— (—)	6 (12)	— (—)	— (—)	2 (4)	— (—)	24 (47)	— (—)	— (—)	4 (8)	0·1 (0·2)	1 (2)	0·1 (0·2)	— (—)	4 (8)	— (—)	— (—)	9 (17)	1 (2)
Sehore																					
Huzur	74	1 (1)	6 (8)	— (—)	— (—)	1 (1)	— (—)	33 (45)	— (—)	— (—)	7 (9)	1 (1)	6 (8)	1 (1)	1 (2)	2 (2)	— (—)	— (—)	15 (20)	— (—)
Sehore	102	1 (1)	25 (25)	— (—)	— (—)	2 (2)	— (—)	38 (37)	— (—)	— (—)	8 (8)	3 (3)	3 (3)	2 (2)	0·3 (0·3)	1 (1)	0·1 (0·1)	— (—)	17 (17)	2 (2)
Khhawar	46	2 (4)	6 (14)	— (—)	— (—)	1 (2)	— (—)	14 (31)	— (—)	0·1 (0·1)	4 (9)	1 (2)	1 (3)	1 (1)	0·2 (0·4)	1 (2)	0·2 (0·4)	— (—)	13 (29)	1 (2)
Birasia	77	0·3 (0·4)	20 (26)	— (—)	— (—)	3 (4)	— (—)	32 (43)	— (—)	— (—)	5 (7)	2 (3)	2 (2)	0·3 (0·4)	0·2 (0·3)	1 (2)	— (—)	— (—)	10 (13)	— (—)

APPENDIX 4 *(Contd.)*

('000 ha)

District/taluk	Gross cropped area	Pd	Jk	Jr	B	M	R	W	Ba	Mt	G	T	Pu	S	Gn	O	G	L	F	Misc.
	Rainfall Zone—IX (contd.)															*Rainfall Pattern—E_4 (A_2C_2) E_4*				
Nasrullaganj	60	0·2 (0·4)	5 (9)	— (—)	— (—)	0·3 (1)	— (—)	28 (48)	— (—)	0·1 (0·3)	3 (5)	4 (6)	2 (4)	— (—)	— (—)	6 (10)	6 (10)	— (—)	3 (6)	— (—)
Damoh																				
Hatta	117	7 (6)	8 (7)	— (—)	— (—)	0·4 (0·3)	— (—)	50 (43)	0·1 (0·1)	7 (6)	9 (8)	2 (1)	10 (9)	0·1 (0·1)	1 (1)	15 (13)	— (—)	— (—)	7 (6)	— (—)
Satna																				
Maihar	63	16 (25)	2 (3)	— (—)	— (—)	1 (1)	— (—)	18 (29)	2 (2)	7 (11)	7 (11)	2 (3)	2 (4)	— (—)	— (—)	7 (11)	— (—)	— (—)	— (—)	— (—)
Amarpatan	87	22 (25)	1 (1)	— (—)	— (—)	0·1 (0·1)	— (—)	25 (29)	2 (2)	11 (13)	7 (8)	3 (3)	4 (4)	— (—)	— (—)	10 (12)	— (—)	— (—)	— (—)	3 (3)
Raghurajnagar	165	23 (14)	4 (7)	— (—)	0·3 (0·2)	— (—)	— (—)	44 (27)	10 (6)	24 (14)	20 (12)	8 (5)	5 (3)	— (—)	— (—)	8 (11)	— (—)	— (—)	— (—)	2 (1)
Guna																				
Raghogarh	108	0·1 (0·1)	34 (31)	— (—)	— (—)	6 (5)	— (—)	31 (28)	— (—)	— (—)	9 (9)	1 (1)	4 (4)	0·2 (0·2)	0·3 (0·3)	7 (7)	— (—)	— (—)	15 (14)	— (—)
Chachaura	73	0·2 (0·3)	29 (38)	— (—)	— (—)	7 (10)	— (—)	13 (18)	0·1 (0·1)	— (—)	6 (11)	1 (1)	5 (5)	0·1 (0·1)	1 (1)	3 (4)	0·1 (0·1)	— (—)	5 (7)	3 (3)
Rajgarh																				
Biaora	76	1 (1)	28 (37)	— (—)	— (—)	4 (6)	— (—)	9 (12)	— (—)	— (—)	6 (8)	2 (2)	2 (2)	0·3 (0·1)	5 (6)	0·4 (1)	4 (5)	— (—)	13 (17)	2 (2)
Narsinghgarh	99	1 (1)	32 (33)	— (—)	— (—)	2 (2)	— (—)	22 (22)	— (—)	— (—)	5 (5)	2 (2)	3 (3)	1 (1)	5 (5)	1 (1)	9 (9)	— (—)	15 (15)	1 (1)
Shajapur																				
Sujalpur	118	1 (1)	37 (30)	— (—)	— (—)	1 (1)	— (—)	39 (33)	— (—)	— (—)	12 (10)	4 (4)	5 (5)	1 (1)	4 (4)	1 (1)	10 (8)	— (—)	1 (1)	1 (1)
Shahdol																				
Beohari	77	28 (36)	3 (4)	— (—)	— (—)	3 (4)	— (—)	5 (7)	3 (4)	18 (23)	2 (3)	2 (3)	4 (5)	— (—)	— (—)	8 (10)	— (—)	— (—)	— (—)	1 (1)
Panna																				
Pawai	102	33 (32)	3 (3)	— (—)	— (—)	2 (2)	— (—)	21 (20)	1 (1)	8 (8)	11 (11)	1 (1)	3 (3)	0·4 (1)	— (—)	18 (17)	— (—)	— (—)	— (—)	— (—)
Jabalpur																				
Muniwara	158	49 (31)	6 (4)	— (—)	— (—)	3 (2)	— (—)	39 (24)	1 (1)	20 (13)	14 (9)	4 (3)	5 (3)	— (—)	— (—)	17 (10)	— (—)	— (—)	— (—)	— (—)
Raisen																				
Udaipur	57	0·4 (1)	6 (10)	— (—)	— (—)	— (—)	— (—)	14 (25)	— (—)	1 (1)	11 (20)	2 (3)	14 (25)	— (—)	— (—)	4 (7)	0·4 (1)	— (—)	3 (6)	2 (1)
Shahdol																				
Bandhagarh	98	22 (22)	2 (2)	— (—)	— (—)	6 (6)	— (—)	9 (9)	1 (1)	32 (32)	8 (8)	2 (2)	4 (4)	— (—)	— (—)	14 (14)	— (—)	— (—)	— (—)	— (—)
Jabalpur																				
Patan	106	6 (6)	11 (10)	— (—)	0·4 (0·3)	0·1 (0·1)	— (—)	26 (25)	— (—)	3 (3)	36 (34)	5 (5)	14 (13)	— (—)	— (—)	3 (3)	— (—)	— (—)	1 (1)	— (—)
	Rainfall Zone—X															*Rainfall Pattern—E_4 (A_2C_2) D_1 E_3*				
Bilaspur																				
Janjgir	166	132 (79)	— (—)	— (—)	— (—)	0·1 (0·1)	— (—)	1 (1)	— (—)	3 (2)	0·2 (0·1)	1 (1)	18 (11)	0·3 (0·2)	0·3 (0·2)	8 (5)	— (—)	— (—)	— (—)	3 (2)

Bilaspur	287	193 (67)	1 (0·3)	— (—)	— (—)	(1)	— (—)	(2)	0·2 (1)	13 (5)	4 (1)	2 (1)	40 (14)	0·4 (0·1)	1 (0·3)	14 (5)	— (—)	— (—)	— (—)	2 (1)
Raipur																				
Balodabazar	286	188 (66)	0·1 (—)	— (—)	— (—)	0·1 (—)	— (—)	2 (1)	0·1 (—)	13 (6)	2 (1)	3 (1)	51 (81)	0·2 (1)	1 (1)	14 (4)	— (—)	— (—)	— (—)	2 (1)
Suraguja																				
Baikunthpur	48	23 (49)	1 (2)	— (—)	— (—)	2 (4)	— (—)	1 (2)	1 (2)	7 (15)	0·4 (1)	1 (2)	7 (15)	— (—)	— (—)	4 (8)	— (—)	— (—)	— (—)	— (—)
Mahendragarh	44	20 (45)	0·4 (1)	— (—)	— (—)	3 (6)	— (—)	1 (2)	2 (4)	9 (19)	0·4 (1)	1 (1)	6 (13)	— (—)	— (—)	3 (8)	— (—)	— (—)	— (—)	— (—)
Durg																				
Bemetara	281	99 (35)	— (—)	— (—)	— (—)	— (—)	— (—)	18 (7)	— (—)	38 (14)	22 (8)	10 (4)	71 (25)	0·2 (0·1)	— (—)	13 (6)	— (—)	— (—)	— (—)	— (—)
Bilaspur																				
Mungeli	238	97 (41)	0·2 (0·1)	— (—)	— (—)	1 (1)	— (—)	11 (5)	—	22 (9)	21 (9)	5 (3)	55 (23)	1 (1)	0·4 (0·2)	17 (3)	— (—)	— (—)	— (—)	8 (4)
	Rainfall Zone—XI			..		..			..		..			..		*Rainfall Pattern—E_4 (A_2 B_1 $C1$) E_4*					
Sidhi																				
Gopadbanas	211	48 (22)	8 (4)	— (—)	— (—)	7 (3)	— (—)	20 (10)	19 (9)	38 (18)	28 (13)	12 (6)	6 (3)	— (—)	— (—)	24 (12)	— (—)	— (—)	— (—)	1 (—)
Jabalpur																				
Sihore	153	53 (34)	1 (1)	— (—)	— (—)	1 (1)	— (—)	48 (31)	— (—)	9 (6)	19 (12)	0·3 (0·2)	12 (8)	0·2 (0·1)	— (—)	7 (4)	— (—)	— (—)	0·1 (—)	3 (2)
Sidhi																				
Deosar	119	10 (8)	2 (2)	— (—)	— (—)	10 (8)	— (—)	3 (3)	19 (16)	43 (36)	5 (5)	6 (5)	5 (4)	— (—)	— (—)	15 (13)	— (—)	— (—)	— (—)	— (—)
Singrauli	70	12 (17)	0·3 (0·4)	— (—)	— (—)	4 (6)	— (—)	1 (1)	10 (14)	26 (37)	2 (3)	2 (3)	3 (4)	— (—)	— (—)	9 (13)	— (—)	— (—)	— (—)	1 (1)
Hoshangabad																				
Seonimalwa	68	0·4 (1)	4 (5)	1 (2)	— (—)	0·2 (0·3)	—	29 (42)	— (—)	2 (4)	4 (6)	3 (4)	5 (7)	— (—)	— (—)	13 (19)	2 (4)	— (—)	4 6)	— (—)
Sohagpur	110	4 (4)	11 (10)	0·1 (0·1)	0·1 (0·1)	0·2 (0·1)	0·1 (0·1)	33 (21)	— (—)	10 (9)	21 (19)	5 (4)	17 (16)	0·1 (0·1)	0·1 (0·1)	13 (12)	— (—)	— (—)	5 (4)	— (—)
Hoshangabad	104	3 (3)	10 (9)	0·2 (0·2)	0·1 (0·1)	1 (1)	— (—)	33 (32)	— (—)	6 (6)	14 (13)	4 (5)	14 (13)	— (—)	— (—)	12 (12)	— (—)	— (—)	5 (5)	1 (1)
Jabalpur																				
Jabalpur	122	21 (17)	2 (2)	— (—)	— (—)	3 (2)	— (—)	29 (24)	— (—)	23 (19)	21 (17)	1 (1)	9 (7)	0·3 (0·2)	0·3 (0·2)	9 (8)	— (—)	— (—)	1 (1)	3 (2)
Narsimhapur																				
Gadawara	137	9 (6)	16 (12)	— (—)	1 (1)	— (—)	— (—)	20 (15)	— (—)	9 (6)	26 (19)	10 (7)	34 (25)	1 (1)	— (—)	7 (5)	0·2 (0·2)	— (—)	2 (2)	1 (1)
Narsimhapur	140	6 (4)	17 (12)	— (—)	1 (1)	0·3 (0·2)	— (—)	26 (18)	— (—)	10 (7)	40 (28)	8 (6)	24 (17)	1 (0·4)	0·1 (0·1)	5 (4)	— (—)	— (—)	1 (1)	1 (1)
	Rainfall Zone—XII			..		..			..			..			*Rainfall Pattern—E_4 (A_2 B_1 C_1) D_1 E_3*					
Shahdol																				
Sohagpur	233	122 (52)	4 (2)	— (—)	— (—)	9 (4)	— (—)	10 (4)	1 (0·3)	44 (19)	7 (3)	4 (2)	13 (6)	0·1 (0·1)	— (—)	20 (8)	— (—)	— (—)	— (—)	— (—)
Balaghat																				
Baihar	79	49 (62)	0·1 (0·1)	— (—)	— (—)	3 (4)	1 (1)	2 (3)	— (—)	15 (19)	1 (1)	— (—)	3 (4)	0·1 (0·1)	— (—)	4 (5)	— (—)	— (—)	— (—)	1 (1)
Surguja																				
Bharatpur	18	9 (48)	0·3 (2)	— (—)	— (—)	1 (6)	— (—)	0,2 (1)	1 (6)	4 (20)	0·1 (0·2)	0·3 (2)	1 (6)	— (—)	— (—)	2 (9)	— (—)	— (—)	— (—)	— (—)

APPENDIX 4 (*Concld.*)

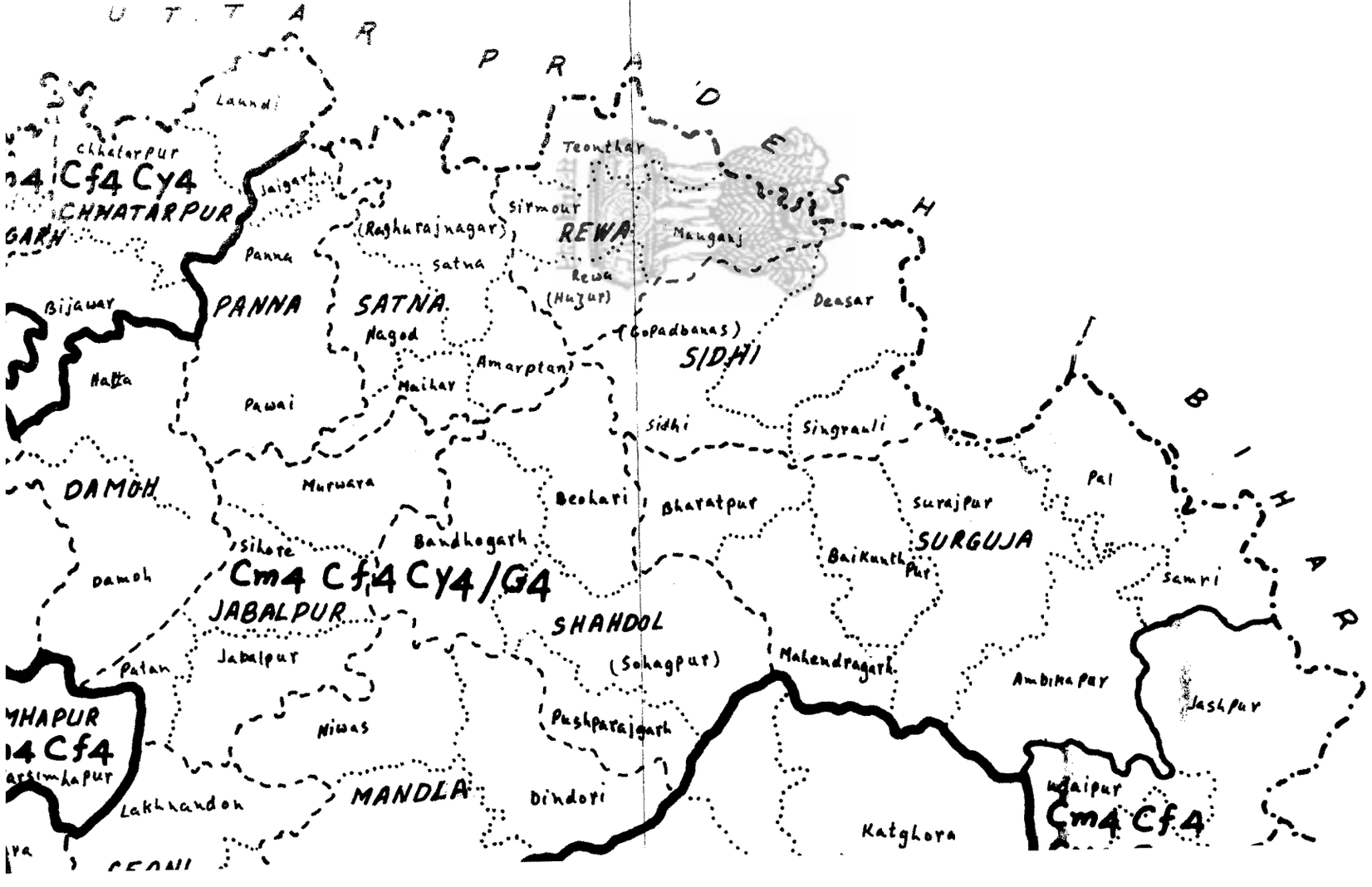
('000 ha)

District/t	Gross cropped area	Pd	Jk	Jr	B	M	R	W	Ba	Mt	G	T	Pu	S	Gn	O	C	L	F	Misc.
	Rainfall Zone—XII (contd.)															*Rainfall Pattern—E_4 ($A_2B_1C_1$) D_1 E_3*				
Mandla																				
Mandla	190	63 (33)	0·3 (0·2)	— (—)	— (—)	9 (5)	— (—)	20 (11)	— (—)	49 (26)	7 (4)	1 (0·4)	21 (11)	1 (0·1)	— (—)	17 (9)	— (—)	— (—)	— (—)	2 (1)
Seoni																				
Seoni	225	65 (29)	11 (5)	1 (0·4)	— (—)	3 (1)	— (—)	52 (23)	— (—)	23 (11)	10 (4)	3 (1)	30 (13)	1 (0·4)	1 (0·4)	22 (10)	—	—	2 (1)	1 (0·4)
Shahdol																				
Pushparajgarh	90	18 (21)	0·2 (0·2)	— (—)	— (—)	6 (6)	— (—)	11 (12)	0·1 (0·1)	25 (27)	3 (3)	1 (1)	3 (3)	— (—)	— (—)	23 (26)	— (—)	— (—)	— (—)	— (—)
Mandla																				
Niwas	136	20 (15)	0·3 (0·2)	— (—)	— (—)	9 (6)	— (—)	14 (10)	0·1 (0·1)	53 (39)	8 (6)	2 (1)	9 (6)	— (—)	— (—)	22 (16)	— (—)	— (—)	— (—)	— (—
Dindon	153	32 (20)	0·2 (0·1)	— (—)	— (—)	7 (5)	— (—)	22 (14)	— (—)	45 (29)	6 (4)	1 (1)	7 (5)	— (—)	— (—)	32 (20)	— (—)	— (—)	— (—)	1 (1)
Seoni																				
Lakhnadon	178	18 (10)	6 (3)	— (—)	— (—)	4 (2)	— (—)	39 (22)	— (—)	50 (28)	18 (10)	2 (1)	11 (6)	— (—)	3 (2)	25 (14)	— (—)	— (—)	0·1 (0·1)	— (—)
	Rainfall Zone—XIII															*Rainfall Pattern—E_4 (A_2B_2) D_1 E_3*				
Raigarh																				
Raigarh	84	69 (82)	— (—)	— (—)	— (—)	— (—)	— (—)	0·1 (0·1)	— (—)	3 (3)	— (—)	0·1 (0·1)	6 (7)	0·4 (1)	2 (2)	2 (2)	— (—)	— (—)	— (—)	2 (2)
Sarangarh	78	60 (77)	— (—)	— (—)	— (—)	— (—)	— (—)	0·2 (—)	— (—)	1 (1)	— (—)	0·1 (—)	9 (10)	0·4 (1)	5 (7)	0·4 1)	— (—)	— (—)	— (—)	2 (2)
Bilaspur																				
Sakti	128	105 (82)	— (—)	— (—)	— (—)	0·4 (0·3)	— (—)	0·1 (0·1)	— (—)	1 (1)	— (—)	0·3 (0·3)	13 (10)	1 (1)	2 (2)	2 (2)	— (—)	— (—)	— (—)	3 (2)
Katghora	142	104 (73)	0·2 (0·2)	— (—)	— (—)	5 (3)	— (—)	0·4 (0·3)	0·2 (0·2)	7 5)	0·4 (0·3)	0.4 (0·3)	17 (12)	0·3 (0·2)	0·1 (0·1)	5 (3)	— (—)	— (—)	— (—)	2 (2)
Raipur																				
Mahasamund	256	195 (76)	0·2 (0·1)	— (—)	— (—)	0·3 (0·1)	0·1 (—)	0·4 (0·2)	— (—)	19 (8)	0·1 (—)	0·4 (0·2)	23 (9)	1 (0·2)	9 (3)	5 (2)	—	—	(—)	2 (1)
Bindranowgarh	128	92 (72)	0·2 (0·1)	—	—	0·4 (0·3)	1 (1)	0·4 (0·3)	— (—)	9 (7)	0·3 (0·2)	0·2 (0·1)	14 (11)	0·1 (0·1)	0·2 (0·1)	9 (7)	— (—)	— (—)	— (—)	1 (1)
Bastar																				
Bijapur	58	47 (81)	0·3 (1)	2 (3)	— (—)	2 (3)	0·1 (0·2)	— (—)	— (—)	3 (4)	— (—)	— (—)	4 (6)	— (—)	— (—)	0·3 (1)	— (—)	— (—)	— (—)	— (—)
Surguja																				
Surguja	160	82 (51)	1 (1)	— (—)	— (—)	8 (5)	0·3 (0·1)	1 (1)	1 (1)	26 (16)	1 (1)	2 (0·4)	21 (13)	0·1 (—)	1 (1)	10 (6)	0·3 (0·2)	— (—)	— (—)	5 (3)
Ambikapur	199	112 (56)	1 (1)	— (—)	— (—)	12 (6)	0·3 (0·1)	2 (1)	0·3 (0·1)	17 (9)	3 (2)	4 (2)	22 (11)	1 (0·3)	1 (1)	21 (10)	0·3 (0·2)	— (—)	— (—)	3 (1)
Raigarh																				
Jaspur	193	101 (52)	0·2 (0·1)	— (—)	— (—)	6 (3)	1 (1)	1 (0·3)	0·2 (—)	30 (16)	2 (1)	1 (1)	19 (10)	0·1 (—)	1 (0·3)	29 (15)	0·3 (0·2)	— (—)	— (—)	1 (1)

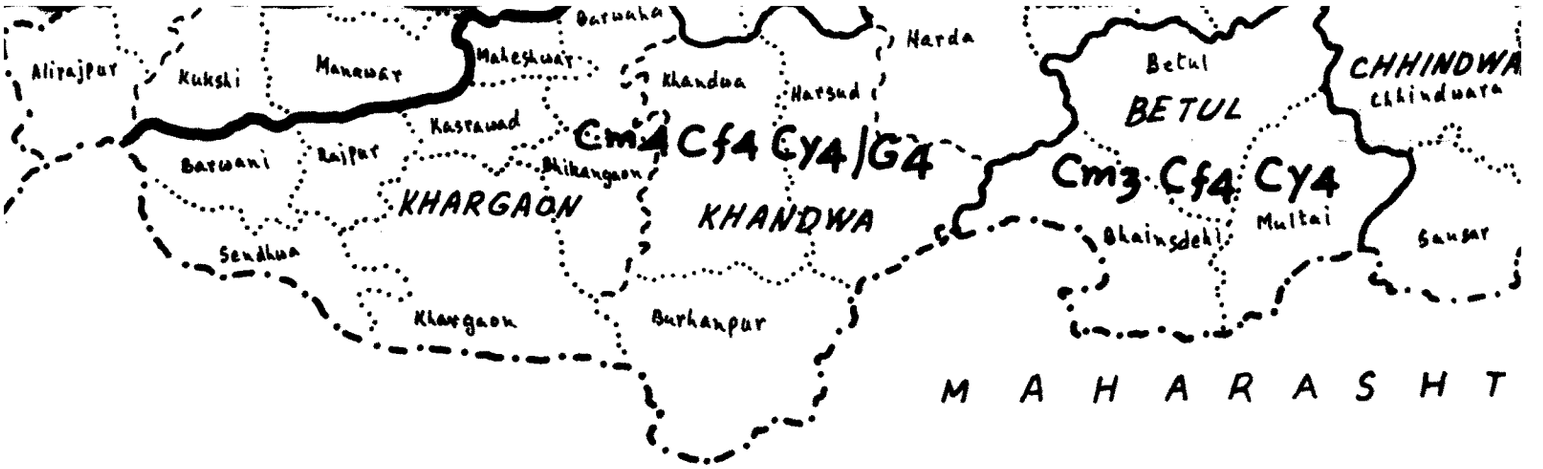
Udaipur	99	57 (57)	— (—)	— (—)	— (—)	3 (3)	— (—)	0·4 (0·4)	— (—)	8 (8)	2 (2)	1 (1)	19 (19)	0·3 (0·3)	2 (2)	4 (4)	— (—)	— (—)	— (—)	2 (2)
Gharghoda	84	54 (64)	— (—)	— (—)	— (—)	0·2 (0·2)	— (—)	0·1 (0·1)	— (—)	7 (8)	0·2 (0·2)	0·2 (0·2)	15 (18)	0·4 (1)	3 (4)	3 (4)	— (—)	— (—)	— (—)	1 (—)
Balaghat																				
Balaghat	126	75 (60)	0·4 (0·3)	— (—)	— (—)	0·3 (0·2)	0·3 (0·2)	4 (3)	— (—)	2 (2)	3 (3)	1 (1)	23 (18)	1 (1)	— (—)	14 (11)	— (—)	— (—)	— (—)	1 (1)
Waraseoni	166	95 (56)	1 (0·4)	— (—)	— (—)	1 (0·4)	— (—)	8 (5)	— (—)	2 (1)	3 (2)	1 (0·4)	24 (15)	1 (0·4)	— (—)	28 (17)	— (—)	— (—)	— (—)	2 (1)
Raipur																				
Raipur	242	138 (57)	0·1 (—)	— (—)	— (—)	0·1 (—)	— (—)	3 (1)	— (—)	13 (5)	1 (1)	3 (1)	62 (26)	0·1 (—)	0·3 (0·1)	17 (7)	— (—)	— (—)	0·4 (1)	4 (1)
Dhamatri	190	121 (64)	0·1 (0·1)	— (—)	— (—)	0·1 (0·1)	1 (0·3)	2 (1)	— (—)	3 (2)	0·4 (0·2)	0·4 (0·2)	42 (22)	— (—)	— (—)	17 (9)	— (—)	— (—)	0·2 (0·1)	3 (2)
Dur																				
Durg	283	140 (49)	1 (0·2)	— (—)	— (—)	— (—)	— (—)	8 (3)	— (—)	19 (7)	3 (1)	5 (2)	80 (28)	— (—)	— (—)	23 (8)	— (—)	— (—)	— (—)	4 (1)
Sanjaribalod	267	140 (52)	0·1 (—)	— (—)	— (—)	1 (0·3)	1 (0·3)	2 (1)	0·1 (—)	36 (13)	2 (1)	2 (1)	60 (23)	— (—)	— (—)	21 (8)	— (—)	— (—)	1 (0·2)	— (—)
Bastar																				
Konker	91	57 (63)	0·4 (1)	— (—)	— (—)	1 (1)	2 (2)	2 (2)	— (—)	11 (12)	1 (1)	0·1 (0·1)	11 (12)	0·1 (0·1)	— (—)	4 (4)	— (—)	— (—)	— (—)	1
Bhanupratappur	49	24 (49)	— (—)	— (—)	— (—)	1 (1)	1 (1)	0·1 (0·2)	— (—)	15 (31)	0·1 (0·2)	0·1 (0·2)	6 (12)	— (—)	— (—)	2 (4)	— (—)	— (—)	0·3 (1)	— (—)
Naryanpur	63	34 (53)	— (—)	— (—)	— (—)	3 (5)	1 (2)	— (—)	— (—)	12 (19)	0·1 (0·1)	0·2 (0·3)	8 (13)	— (—)	— (—)	4 (6)	— (—)	— (—)	— (—)	1 (2)
Jagdalpur	178	105 (59)	1 (0·4)	— (—)	— (—)	7 (4)	4 (2)	0·3 (0·2)	— (—)	32 (18)	0·4 (0·2)	1 (0·4)	9 (5)	1 (0·4)	— (—)	16 (9)	— (—)	— (—)	— —	1 0·4)
Konta	76	48 (63)	3 (3)	0·4 (1)	— (—)	2 (2)	0·3 (1)	— (—)	— (—)	16 (22)	— (—)	0·3 (1)	5 (6)	— (—)	— (—)	1 (1)	— (—)	— (—)	0·3 (0·3)	— (—)
Surguja																				
Samri	50	21 (42)	— (—)	— (—)	— (—)	4 (8)	1 (1)	0·4 (1)	0·4 (1)	9 (19)	0·4 (1)	1 (1)	2 (5)	— (—)	0·1 (0·2)	10 (19)	0·4 1)	— (—)	— (—	1 1
Durg																				
Rajnandgaon	185	85 (46)	— (—)	— (—)	— (—)	— (—)	— (—)	3 (2)	— (—)	25 (14)	2 (1)	4 (2)	42 (23)	— (—)	— (—)	22 (10)	— (—)	— (—)	— (—)	2 (1)
Bastar																				
Kondagaon	104	69 (66)	0·2 (0·2)	— (—)	— (—)	6 (6)	3 (3)	0·2 (0·2)	— (—)	6 (6)	0·3 (0·3)	0·2 (0·2)	11 (10)	0·2 (0·2)	— (—)	7 (7)	— (—)	— (—)	— (—)	2 (2)
Dantewara	108	45 (41)	0·4 (1)	— (—)	— (—)	4 (4)	0·3 (0·3)	— (—)	— (—)	47 (42)	— (—)	0·4 (1)	5 (5)	— (—)	— (—)	4 (4)	— (—)	— (—)	1 (1)	2 (2)
Surguja																				
Pal	71	17 (24)	1 (1)	— (—)	— (—)	5 (8)	1 (1)	1 (1)	3 (5)	28 (39)	0·4 (1)	1 (1)	5 (6)	— (—)	0·1 (0·1)	7 (10)	— (—)	— (—)	— (—)	2 (2)

771Deptt of Agri./76—GIPF.

MADHYA PRADESH
LIVESTOCK PATTERNS



RAJASTHAN
GUJARAT
MORENA
Bijeypur
Sabalgarh
GWALIOR
Pichhore
Pohri
Sheopur
DATIA
Datia
Cm4 Cf4 CY4 G4
SHIVPURI
Shivpuri
Karera
Kolaras
Pichhore
Guna
Ashoknagar
GUNA
Mangaoli
Chachaura Binaganj
Raghogarh
Jawad
Manasa
Bhanpura
Neemuch
Garoth
MANDSAUR
Malhargarh
Mandsaur
Silamau
Khilchipur
Rajgarh
RAJGARH
Biaora
Susner
Agar
Alot
Jaora
RATLAM
Mohidpur
SHAJPUR
Sarangpur
Khachrod
Tarana
Shajapur
G4 Cm4 Cf4 CY4
Sailana
Ratlam
UJJAIN
Badnagar
Shujalpur
Sehore
SEHORE
Bhopal
Ujjain
Sonkatch
Ashta
Ichhawar
Dewas
Sawer
Depalpur
INDORE
Bagli
Cm4 Cf4 CY4
DEWAS
Khategaon
Nasrullaganj
Indore
Thandla
Petlawad
Badnawar
JHABUA
Jhabua
Sardarpur
DHAR
Lateri
Siron
Kurwai
Khurai
Basoda
VIDISHA
Berasia
Vidisha
Cm3 Cf4 CY4
Raisen
Hajar
Gairatganj
RAISEN
Gohargani
Barally
Silwani
Udaipura
Budni
Sohagpur
Hoshangabad
SAGAR
Sagar
Begamganj
Cy4C
Godarwara
Amarwara



LEGEND

LIVESTOCKS	SYMBOLS
CATTLE:	
Males over 3 years	Cm
Females over 3 years	Cf
Youngstock 3 years and under	Cy
BUFFALOES:	
Males over 3 years	Bm
Females over 3 years	Bf
Youngstock 3 years and under	By
Sheep	S
Goats	G
Horses/Ponies	H
Mules	M
Donkeys	D
Camels	Ca
Pigs	P

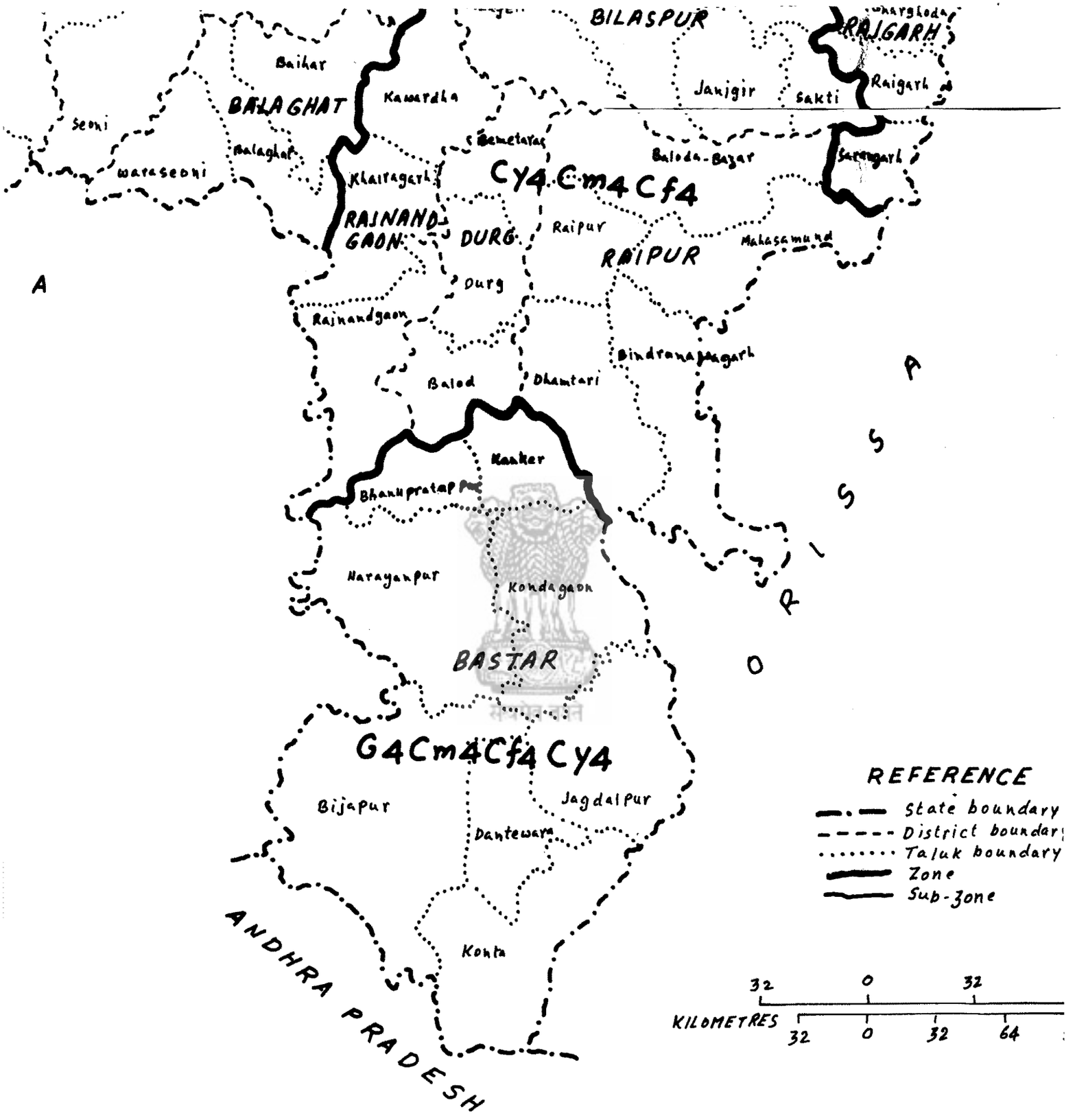
A distribution which is the same over two or more adjoining taluks is called a Pattern, if the percentage of individual catagories is 10 or more and the total is not less than 70 Percent.

Interval Subscript	Perentage of total livestock of Taluk
1	greater than 70
2	50-70
3	30-50
4	10-30
5	Less than 10

EXAMPLE:	Male cattle	Sheep	Goats
Livestock Pattern:	Cm3	S4	G4
Percentage :-	30-50	10-30	10-30

सत्यमेव जयते

ased upon Survey of India map with the permission of the Surveyer General of India.



© Government of India copyright, 1976.