

A GEOGRAPHICAL ANALYSIS OF THE CALORIES AVAILABLE FROM DIFFERENT CROPS IN MADHYA PRADESH

P. D. Tiwari, Sagar

ABSTRACT : A Geographical analysis of calories for different crops in M. P. has been made.

INTRODUCTION

The problem which India faces today is the increasing pressure of population on the limited resources of agricultural land and it is very acute. To get a clear insight of the balanced and integrated economic development of an area in an agrarian country like India, it is highly essential to analyse critically the available calories and correlative view of the agricultural production, so that the surplus/deficit on district level, with a view to having a sound and proper planning for the future.

The main objectives of the present study are

- (i) to analyse the item-wise share of calories
- (ii) to analyse the caloric availability of the area and
- (iii) to classify the districts into deficit/surplus categories.

The result of the study can be of considerable significance for increasing food production and reducing under-nutrition and mal-nutrition.

Madhya Pradesh (18°0'–26°30' N. and 74°0'–84°30' E.) is the largest among the Indian states. It comprises an area of 443411 km² and a population of 52138467 persons. It is girdled by seven other states and may rightly be called as the heart of India. The north-central part of the Deccan Tableland comprising of Malwa, Madhya

Bharat, Bundelkhand and Baghelkhand Plateaus. Dandkaranya or Bastar, the Satpura range and the Chambal Narmada and Mahanadi Valleys fall within its boundaries.

METHODOLOGY

On the basis of the total produce available for consumption and the total population dependent on this produce, Food Balance sheets have been prepared of each district in order to assess the per capita food production availability and caloric availability in the area under study. All major crops have been included but most of the vegetables, fruits, and animal products are conspicuous for their absence and no data were available for them. The district-wise food for consumption has been included after deducting 16.8 per cent (for seed, feed, wastage and other extraction) out of the total agricultural produce. The remaining district-wise figure of production in tonnes has been converted into calories and divided by

- (a) the total number of days in a year, and
- (b) the total district-wise population for 1981.

The production data are also based on the crop year 1980–81. On the basis of per capita daily consumption, district-wise deficit/surplus calories have been calculated. Finally, all the district have been grouped under the different deficit/surplus categories.

CALORIC AVAILABILITY FROM DIFFERENT CROPS

The analysis of calories available from each crop is essential to understand the pattern of food supply. The positional share of each crop in total availability of calories of the area is relative to their areal coverage and per hectare production. The share of different crops in the total calories available in the area is mentioned in fig. 1 to 5.

Almost more than half of the total available calories (56.97 per cent) are provided by the rice and wheat only. While grading the available calories obtained from different crops, the wheat comes first which is followed by rice, pulses, jowar-bajra, fruits and vegetables, millets and sugarcane in descending order and is similar to that of crop rankings (Table I).

WHEAT

Wheat, the most important crop of Madhya Pradesh at present, supplies more than 30 per cent of the gross total available calories. Among the districts of the state, more than 20 per cent, get below 50 per cent of their total calories from wheat. For example, Vidisha district receives the maximum percentage (58.77) of calories from wheat, whereas Bastar district gets the least (0.68 per cent). Out of the wheat producing districts, 8 (17.78 per cent) receive below 10 per cent, 6 (13.33 per cent) below 20 per cent, 9 (20 per cent) below 30 per cent, 4 (8.89 per cent) below 40 per cent, 8 (17.78 per cent) below 50 per cent while 10 (45 per cent) districts obtain above 50 per cent of their gross calories from this staple (Fig. 1.1). The distribution of districts having different caloric values of wheat unfolds some interesting facts. Firstly, districts receiving the maximum percentage (50) of calories from wheat, are mostly situated in the Bundelkhand plateau and Madhya Bharat plateau of the state. Second-

dly, districts situated in the Chhattisgarh basin obtain below 10 per cent of their total calories from wheat.

RICE

Rice stands next to wheat in this respect and provided about 26.15 per cent of the total. However, certain individual district get much higher percentage of calories from rice than this average figure. In this connection mention may be made of district Raipur which derives as much as 70 per cent of its gross available calories from it. However, there are other districts which receive the least percentage of calories from this crop, e.g. Ujjain, getting only 0.06 per cent of its total calories from rice. In fact, out of the total districts, about 18 (40 per cent) receive less than 5 per cent of the total calories from this crop. Districts belonging to this category are mainly situated in the Malwa Plateau. But in the Madhya Bharat Plateau also (about 7 in number), their existence cannot be ignored. Furthermore, 10 districts receive more than 50 per cent of the calories from rice (Fig. 1.2). The districts are mainly located in Chhattisgarh basin, Betul Chhindwara Plateau and the Upper Narmada Basin. This variability lies in the nature of the soil and rainfall. The rice has become most important staple for the caloric contribution of the area, because of its production on higher acreage and its per hectare higher yield.

PULSES

Pulses is the third among the important crops, as regards the caloric availability. About 18.68 per cent of the gross available calories are received from pulses. Out of the total, 16 (35.55 per cent) districts receive below 15 per cent of the calories from this crop while 24 (53.33 per cent) districts get in between 15 to 30 per cent and of the remaining, 2 (4.4 per cent) districts

MADHYA PRADESH

CALORIC AVAILABILITY FROM DIFFERENT CROPS
IN PER CENT

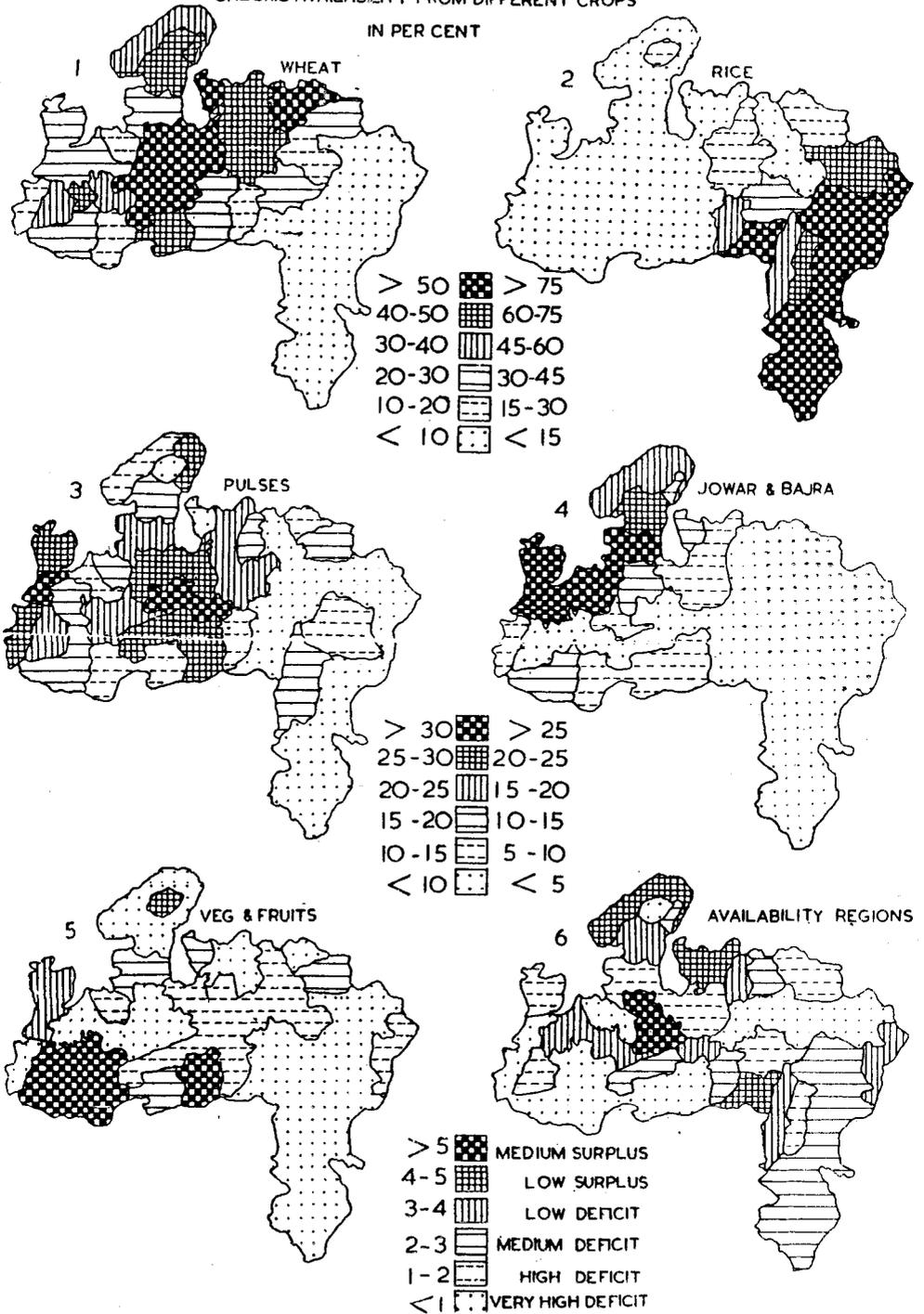


Fig. 1

TABLE I
Caloric availability from different crops in Madhya Pradesh
(In percent)

DISTRICTS	Rice	Wheat	Pulses	Oil Seed	Jowar & Bajra	Maize	Barley	Millets	Sugar-cane	Vegetables	Total Calories
Raipur ..	87.8	2.3	6.4	1.3	—	—	—	1.4	0.2	0.4	2156
Durg ..	72.0	2.9	20.0	1.6	—	—	—	3.3	0.1	0.5	1758
Rajanandgaon ..	63.8	3.3	17.5	4.4	—	—	—	6.7	3.9	0.3	2353
Bastar ..	85.8	0.7	4.0	1.9	1.3	0.2	0.1	5.1	0.4	0.4	1988
Bilaspur ..	80.9	2.9	11.0	1.4	0.1	—	1.3	1.3	0.3	0.5	2139
Sarguja ..	73.7	4.0	6.9	4.5	0.8	0.4	—	8.3	0.6	0.7	1650
Raigarh ..	81.7	1.4	4.9	4.2	1.7	—	—	1.5	2.9	1.6	2268
Sagar ..	3.3	55.8	26.7	3.0	7.0	—	0.5	0.7	3.3	1.7	1747
Damoh ..	16.0	43.3	24.3	3.3	7.9	—	—	0.9	2.9	1.1	1915
Panna ..	15.1	44.9	15.6	6.9	3.6	—	5.4	1.6	6.0	0.8	2354
Tikamgarh ..	6.5	54.7	10.0	1.6	11.0	—	8.5	7.7	0.7	2.3	2423
Chhatarpur ..	1.3	45.7	24.4	2.3	6.2	—	15.0	4.1	0.2	0.7	2587
Rewa ..	22.7	50.3	11.8	2.8	2.7	—	4.3	4.4	—	0.8	1760
Sidhi ..	22.3	11.4	16.3	3.2	2.5	0.3	22.2	16.9	3.8	2.0	1700
Satna ..	14.0	60.7	9.7	2.3	2.0	—	6.8	2.9	—	1.5	1935
Shahdol ..	65.0	11.5	5.5	3.7	1.4	—	2.1	7.4	1.4	1.7	1546
Ujjain ..	0.5	23.5	17.5	8.4	48.7	0.2	0.1	—	0.1	0.5	2170
Mandsour ..	0.2	29.2	26.3	8.3	34.5	1.4	0.5	—	1.8	3.2	1888
Ratlam ..	1.4	24.2	30.9	5.3	29.7	0.8	0.1	0.9	3.6	3.0	1533
Shajapur ..	1.0	24.5	14.0	9.7	48.7	0.2	0.1	—	1.3	0.5	2172
Morena ..	2.3	35.7	14.0	23.4	19.4	—	2.6	—	1.8	0.7	2605
Bhind ..	4.4	35.0	28.9	6.2	15.6	—	9.5	—	0.1	0.9	2602
Gwalior ..	16.4	46.5	3.6	4.6	19.6	—	1.8	—	3.4	4.1	1614
Shivpuri ..	4.1	40.5	17.2	7.3	22.2	0.4	5.9	0.8	0.9	0.9	3117
Guna ..	0.8	27.3	20.1	4.0	42.9	0.4	0.2	1.0	0.5	2.6	1786
Datiya ..	0.7	52.4	27.0	1.8	14.7	0.0	2.4	0.1	0.2	0.6	2588
Bhopal ..	0.1	56.4	26.5	2.6	13.5	0.1	—	0.2	0.1	0.1	828
Vidisha ..	0.3	58.8	26.3	2.8	10.9	0.2	0.1	—	0.2	0.3	2746
Rajgarh ..	2.8	19.5	16.3	9.7	49.0	0.4	0.1	—	0.4	1.7	871

TABLE I—Contd.

DISTRICTS	Rice	Wheat	Pulses	Oil Seed	Jowar & Bajra	Maize	Barley	Millets	Sugar-cane	Vegetables	Total Calories
Hosangabad ..	3.7	52.4	28.5	11.1	1.8	0.1	—	0.8	0.2	1.6	1974
Narsingpur ..	9.1	24.5	56.7	2.5	1.8	0.1	—	1.1	2.6	1.6	2358
Jabalpur ..	21.8	47.7	23.1	2.5	0.9	0.4	—	2.2	0.1	1.4	1112
Indore ..	0.1	46.6	19.7	12.0	3.1	0.6	—	—	4.3	13.2	1203
Dewas ..	0.8	33.1	20.1	18.4	0.8	0.8	—	—	3.1	8.7	1628
Sehore ..	2.1	50.8	24.7	10.3	7.8	0.4	—	—	2.5	0.8	2191
Raisen ..	1.2	55.1	37.4	4.3	0.1	0.1	—	0.8	1.6	0.3	3164
Seoni ..	52.6	17.2	15.0	5.3	1.3	0.6	—	5.6	0.6	1.7	1933
Balaghat ..	84.3	3.9	5.1	4.9	0.1	0.2	—	1.4	1.0	0.6	2635
Chhindwara ..	9.8	21.3	26.7	10.8	5.6	1.8	—	3.1	8.6	12.4	864
Betul ..	12.6	41.7	14.6	11.3	8.1	1.2	—	3.7	4.5	2.2	1294
Dhar ..	2.7	35.7	23.4	23.8	3.1	5.3	—	—	0.5	5.3	1778
Mandla ..	45.0	25.8	7.9	8.7	0.1	2.1	—	9.3	0.3	0.7	1908
Khargaon ..	5.0	28.9	17.9	26.6	12.6	3.5	—	—	1.5	6.8	816
Jhabua ..	12.4	19.0	25.7	22.9	6.7	11.0	—	1.3	0.4	0.8	940
Khandwa ..	12.3	15.5	10.8	7.5	8.0	0.2	—	0.5	1.0	44.0	1259
AVERAGE ..	26.1	30.8	18.7	7.2	10.6			3.2	1.6	3.1	188.5

get between 30 to 40 per cent of the calories while one (Narsingpur district) derives above 50 per cent of the calories from pulses (Fig. 1.3).

JOWAR AND BAJRA

Jowar-bajra are the fourth among the important crops, as regards the caloric availability. As such jowar-bajra share is more than 10 per cent in the gross total available calories in the region. Surprisingly, in the Malwa Plateau and western part of the Madhya Bharat Plateau in certain districts, jowar-bajra contributes more than 45 per cent of the total available calories (Fig. 1.4). It is because of the fact that

this region, by and large, exceeds other competitive food crops in acreage particularly due to the suitability of the soil. Relatively, lower percentage of calories from this crop is derived in the district located in the Chhattisgarh basin and Betul Chhindwara Plateau. The differentiation lies in the variation of acreage devoted to the jowar-bajra culture and so also to its productivity rates in different regions. Of the total jowar-bajra producing districts, 30 (66.67 per cent) receive below 10 per cent, 8 (17.77 per cent) 10 to 20 per cent, 2 (4.44 per cent) 20 to 30 per cent, one below 40 per cent and 4 (8.89 per cent) districts obtain in between 40 to 50 per cent.

FRUITS AND VEGETABLES

It is deduced that vegetables and fruits have been very insignificant share in the available calories for food. Only 2.9 per cent of the total calories are obtained from these crops. Though certain districts receive as much as 20 per cent of their calories from these crops little less than half (48.88 per cent) of the districts get below one per cent of their calories from these crops, and 10 (22.22 per cent) districts receive in between 1 to 2 per cent, while 4 get only 2 to 3 per cent. Further, 3 and 6 districts obtain in between 3 to 5 per cent and above 5 per cent of their calories from fruits and vegetables (Fig. 1.5). The concentration of such districts is limited to Malwa Plateau and the Narmada basin only. The little contribution of fruits and vegetables in the available gross calories of the area may be ascribed to the very small acreage devoted to their cultivation, partly because of the low living standard and partly due to underdeveloped transport system and storage facilities. However, with the techno-agricultural advancement, it is very much expected that the per capita caloric-availability from these crops may go up than the present meagre average because of the fact that fruits and vegetables are getting incentives not only in the localities near the cities and markets but in the remote rural area also. This is doubly increased due to improve irrigational facilities and the changes in the taste of the people.

MILLETS

It is deduced that millets have very insignificant share in the available calories for food. As such, they contribute only 3.20 per cent to the gross available calories of the area. A little less than 71 per cent of the districts derive below 3 per cent of their calories from millets. Further 8 (17.78 per cent) districts get between 3 to 6 per cent, 3 (6.67 per cent) 6 to 9 per cent and the remaining 2 (4.40 per cent) obtain

above 9 per cent. Districts situated in the Malwa Plateau and the Madhya Bharat Plateau are quite unimportant for the caloric values from these crops as they all receive below 2 per cent of the entire calories. Whereas, those districts which are situated in hilly tract areas of the state bear some importance as they get in between 6 to 9 per cent of the whole calories from millets. Moreover, in certain districts, the caloric percentage from millets reaches as much as 16 per cent (Sidhi district).

SUGARCANE

Sugarcane is quite insignificant as regards the caloric availability in the region. It shares only 1.64 per cent in the total available calories. The Malwa Plateau, the Narmada Valley and the Madhya Bharat Plateau receive higher caloric percentage from this crop. The availability varies from 0 per cent (Satna district) to 8.50 (Chhindwara district). Out of the total, 26 (57.80 per cent) districts receive less than 1 per cent of their gross calories from sugarcane. Of the remaining 11 (24.40 per cent) districts get between 1 to 3 per cent of the calories while the rest 17.80 per cent district derive above 3 per cent of the calories from this crop. The higher availability of the sugarcane calories from the Malwa Plateau, the Madhya Bharat Plateau and the Narmada basin may be accounted to the higher acreage devoted to the sugarcane culture and to the good fertile soil assisted by the developed irrigational complex.

AVAILABILITY OF CALORIES

About 70.82 per cent of the calories availability is supplied by cereals. Pulses contribute almost 18.68 per cent calories of the study region. On the average the per capita daily availability of 1885 calories is a less than the recommended allowances, i.e. 2400 calories. But it is not uniform in all the districts. The maximum calories

availability has been reported in Raisen district i.e. 3164 per capita per day and the minimum in the Khargaon district (816). A further analysis indicates that about 24.4 per cent of the total districts are getting less than 1600 calories, nearly 55.5 per cent are getting between 1600–2400 calories and about 20.1 per cent of the districts are getting above 2400 calories.

SPATIAL DIMENSION OF THE CALORIC AVAILABILITY

To achieve a proper and true perspective of the caloric position in all the districts, it is highly essential to analyse the per capita daily available calories from different items, so that a final balance sheet may be prepared. For convenience, the index of deficit/surplus has been calculated and the district have been classified into different groups. Six groups are made exhibiting medium surplus, low surplus, low deficit, medium deficit, high deficit and very high deficit (Fig. 1.6).

MEDIUM SURPLUS

Two (4.44 per cent) districts are included under this head, which report a surplus of calories by more than 10 per cent and are found in Madhya Bharat Plateau. The moderate surplus in these districts is very much related to the high areal coverage and good production of wheat and pulses per hectare. Moreover, this is adequately supported by good quality of soil and fertilizers. The caloric availability is quite large, because of smaller degree of population concentration and surplus production of foodstuffs. Proportion of net sown area in this region is very high, intensity of irrigation and double cropped area is moderate. Consequently, the high caloric availability in these areas is associated with the small size of population, more food production and more agricultural development.

LOW SURPLUS

About 11 per cent districts supporting 9.67 per cent population of the state recorded low surplus availability of calories. They include the Morena, Bhind, Balaghat, Tikamgarh and Chhatarpur districts. The Bhind Morena Plateau yielded higher food production in combination with large population. The Bundelkhand Upland occupies Tikamgarh and Chhatarpur districts of the state. The Chhatarpur Upland registered medium food production but smaller population size. As a whole this is one of the most developed parts of the state in terms of agriculture.

LOW DEFICIT

This category is composed of eight districts out of fortyfive, about 11.06 per cent population of the state and extend in four compact areas

- (i) Chhattisgarh basin in the mid east,
- (ii) the Bundelkhand Upland in the east and north-east,
- (iii) the Malwa Plateau in the central part, and
- (iv) some part of the central Narmada basin.

They are scattered throughout the area and show a deficit in calories by 10 percent only.

MEDIUM DEFICIT

In this category seven (15.50 per cent) districts are included which exhibit the deficit of 10 to 20 per cent. They include the Raipur, Bastar, Bilaspur, Seoni, Hosangabad and Satna districts. These districts seem to have been distributed throughout the area but are mainly clustered in Chhattisgarh basin. The rice growing tribal Dnadkaranya in the extreme southern part of the state, lower availability. It is associated with very low proportion of cultivated area (only 19 per cent) and very high proportion

of forested area (64 per cent). Area under double cropping, irrigation, high yielding varieties and use of fertilizers is very low. These conditions resulted in lower food production and the level of caloric availability is consequently low. In this category also, the conditions are similar to those mentioned above. The higher density of population has done more damage than the low yield.

HIGH DEFICIT

In this category, one fifth (20 per cent) of all the districts are included within this category which are deficit in calories by below 30 per cent. They include Durg, Sagar, Damoh, Rewa, Sidhi, Mandsoor, Guna, Dhar and Mandla which are seen scattered throughout the area. These areas are those parts of the state where net sown area is moderate and the area under double cropping is small.

VERY HIGH DEFICIT

Districts having very high deficit calories are 14 (31.11 per cent) in number and supporting about 32 per cent population of the state recorded very high deficit availability of calories. The extent over the Betul Chhindwara Plateau, the Malwa Plateau, the Narmada Basin, The entire Betul Chhindwara Plateau and western tribal zone of the Narmada basin recorded very high deficit availability of calories. The proportion of cultivated land and double cropped area is very low. On the other hand, size of the population is large. These conditions result in the lower availability of calories. The cotton growing areas of the Malwa Plateau also recorded very lower availability region mainly due to commercial crop and non-food crop production. This extremely high deficit is primarily due to the low per capita available land. However, it is also noticed that districts having higher popu-

lation density have got higher deficit. Besides, the more urbanised parts of the state signify lower level of caloric availability. Thus it can be said at the very outset that the deficit is caused more by the high population pressure than the poor production.

CONCLUSIONS

For the efficient use and planning of food resources in the India, numerous states/regions need careful investigation on the extent of the regional pattern of surplus and deficit food production. This will help in deducing a sound and proper harmonious planning in the future. The area under study receives on an average, 1882 calories per day per capita consumption. The caloric contribution of different crops in the area is relative to their total areal coverage and per hectare yield. Wheat, rice, pulses, jowar-bajra, Oil-seeds, vegetables and fruits, millets and sugarcane contribute 30.82, 26.15, 18.68, 10.65, 7.23, 3.07, 2.31 and 1.64 per cent respectively of the gross available calories. The picture emerges that the state is deficient in total calories by 22.58 per cent.

In order to obtain a harmonious and proper planning pattern of the state and more so to get a surplus in the required calories, a drastic change in the existing cropping is a necessity. Need of new devices to increase the per hectare yield is also essential. There are many ways of increasing the agricultural production and thereby raising the nutritional level of the study region such as

- (i) by suitable change in the cropping pattern,
- (ii) by increasing the crop yields,
- (iii) extending the area under crop,
- (iv) by reducing losses
- (v) by nutritional education programmes etc.

ACKNOWLEDGEMENT

The author is thankful to Prof. V. C. Misra, Head, Department of General and Applied Geography, U.T.C. Sagar for pro-

viding encouraging facilities in the Department. The author is also grateful to Dr. Kailash Choubey in the same Department for his suggestions.

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Address of the Author

Dr. P. D. Tiwari,
 Department of General and Applied Geography,
 University of Sagar,
 Sagar 470003 (M.P.)