SUMMARY AND CONCLUSIONS
A great deal is being spoken and written about the impact of the growing numbers on the country's resources. However, there is no unanimity among experts on the precise nature of this impact. One section feels that population growth must be checked if the country has to avoid a crisis of epic proportions in the coming decades. There are others who think that the country would not have made so much progress, especially in the field of agriculture, if there was no sharp increase in the numbers. The present study was planned and conceived to find out which of these two positions is borne out by the objective data pertaining to a small region.

**Physical Setting**

Sagar-Damoh Plateau, the region whose population and agricultural resources have been subjected to an in-depth study and analysis in the present work, is both typical and atypical of the rural India. It shares general backwardness, illiteracy, poor quality of life and a tendency to rapid population growth, which according to some is really a consequence of the first three, with the rest of rural India or at least the bulk of it. It is atypical largely because of its topography. This region can be cited as an example of what geology, physiography and the nature of terrain can do to the areal personality of a region.

This region is really a table-land comprising two distinct geological entities. The Sagar plateau is covered
with lava-flows while the Damoh plateau is dominated by pre-
cambrian formations. It is a three-tier structure, the Vindh-
yans overlying the Bijawars and the latter placed on Archaens,
unconformably in both the cases. As a result, the region is
largely rocky with little capacity for water retention. The
characteristic Sagar-Damoh landscape consists of flat-topped
plains and conical hills. If the region is not poorer than
it is, this is because alluvial deposits provide the top-soil
in many, though not in all, parts of the region.

The region can be divided into three highlands,
Northern, Southern and Western and the three uplands of Kobra,
Sonar and Dhasam, small rivers which nearly dry up during the
summer months. Of these, the Western highlands and the uplands
of Sonar and Kobra have relatively better economic conditions
while the rest of the region is rather poor. Soils of this
region, even in the best segments, are not as good as the
good Ganga alluvium. The soils on the plateau are medium in
nitrogen and potassium but low in phosphorus while those on
the Damoh plateau are low in nitrogen and phosphorus though
medium in potassium. According to the experts the soil of this
region is likely to respond favourably to chemical nutrients.
The region has a great deal of soil erosion. Nor does the
climate help the farmer. Local farmers have been known to
depend on the vagaries of rain gods.

The region is not particularly rich in water-resources. It has got seven rivers—Bina, Dhasam, Beamsa, Bevas,
Sonar, Banner and Hiran—but not even one of these can be
considered really perennial. No dams and canals can be built on these and only adjoining areas can benefit from them. In addition there are several lakes and tanks. This paucity of water has adversely affected the agricultural potential of this region and, worse still, is likely to come in the way of any major development plan.

Accessibility through road and rail is another major barrier to quick progress. The hilly terrain does not permit the laying of rail-lines. The entire region has only one line passing through it. Similarly, only one National Highway - Number 26 - passes through this tract of nearly 12 thousand square kilometres. Not more than 25 per cent of the villages in any tahsil are connected by nucca roads. What this poor accessibility can do to the economy as well as modernisation of a region can easily be imagined. Yet, the hard-working Bundelas and others inhabiting this region have managed to eke out some kind of a living for all these centuries and millennia.

DEMOGRAPHIC SITUATION:

The region is one of the less populated parts of Madhya Pradesh. The arithmetic density of this region is 114 persons per square kilometre, which is lower than the State average. The picture is rather uneven. While 9 per cent of the patwari circles have more than 150 persons per square kilometre and 8 per cent fewer than 50, 83 per cent patwari circles have a range of 50 to 150. The density seems to follow the dictates of topography and productivity of land.
The variation is much more in the case of physiological density. Though the average is 149 persons per square kilometre, the range is from 11 to 724. This wide range suggests extensive underpopulated areas on one hand and overpopulated tracts on the other. In some cases, families live and work in the urban centres while the male workers stay on in the villages. In others, towns have spilled over in the villages situated nearby. High agricultural density appears to be in direct proportion to high physiological density, while the low density areas are all near urban centres. Nutritional density – population in relation to the net sown area – is rather high in the backward Northern and Southern highlands, though this is mostly due to scarcity of good arable land than to over-population. Bulk of patwari circles with moderate nutritional density – between 100 and 200 persons per square kilometre – belong to the better-off Western highlands.

Pattern of distribution of population is largely shaped by the factors determining the initial productivity of the segment. Though predominantly rural, this region was 2.53 per cent less so than the State as a whole. Percentage of uninhabited villages in this region is also higher. There are a few clusters of densely populated areas in the river basins and along the railway tracks. Moderately populated areas are spread all over the better-off segments. The poorer segments have sparse population also. The region has nearly 14 per cent uninhabited villages which have unfortunately not been taken note of by the Census authorities.
Growth of population has been somewhat less rapid in this region than in the country as a whole, perhaps due to smaller increase from net migration. While 13 per cent of the patwari circles grew at the rate of natural increase, 23 per cent showed a downward trend. It is interesting to note that population increase was markedly higher in the Southern highlands and Sonar upland during the first four decades of this century. The Western highlands showed a higher growth in the next three decades. In the last decade, however, Southern highlands regained the earlier position. This certainly seems to suggest a link between backwardness and higher population growth.

This region has always fewer women than men. The 1981 Census have recorded the lowest sex-ratio so far in this century. This is true for the State as a whole also. Males outnumber females in both towns and villages, though the rural sex-ratio has been consistently higher. This may be due to male-selective migration from rural to urban areas. The lowest sex-ratio is found in the Northern highlands, indicating its poverty and backwardness as well as relative insecurity due to forests. Menfolk feel obliged to live and work alone in these areas. The Western highlands also showed a low sex-ratio in the 1971 Census, but this was really due to the male in-migration for wheat harvesting at the time of census-operations. The Southern highlands is also backward. Yet it has a high sex-ratio only because the males of this segment have an option to go and work in the industries of
adjoining Jabalpur leaving their families behind. In fact, sex-selective migration has produced male-deficient areas in the Southern highlands and Sonar upland and female-deficient areas in the Western highlands. Sex-ratio differs from age-group to age-group also due to the same reasons of mobility and morbidity.

As much as 44.5 per cent of the total population of this region belonged to 0-14 age-group. Those above 60 were 5 per cent. Consequently, the dependency-ratio in this region is 99 per cent in the rural sector. In the urban areas, however, both 0-14 and 60+ age-groups are somewhat smaller and the dependency ratio is 96 per cent. The age-composition is without any sharp variations all over the region, in villages and towns. However, the high dependency-ratio in the villages needs a little re-thinking in that it can not be said in all fairness that all those belonging to 0-14 and 60+ age-groups are really economic liabilities. There is a noticeable tendency among male workers to first go to urban centres to find employment and then to come back home on getting too old. This slightly inflates the 60+ age-group in the rural areas.

Migration-data are unfortunately not available patwari-circle-wise and have to be deduced from the figures for population growth. Yet, it can be said that most migrants in this region are short-distance migrants and also that migrations are for short periods like harvesting season. Migration to towns in search of jobs or to neighbouring industrial areas account for the remaining migrants. Areas where in-migration
substantially exceeded out-migration are the wheat-producing river basins and the Western highlands. This can be described as the belt of pull force. The areas of Northern and Southern highlands adjoining forested segments are the reverse.

Though no recognised scheduled tribe inhabits this region, the percentage of scheduled castes in the total population is nearly 8 per cent higher than the State average. Almost one-fifth of population belongs to this category. There are sharp areal variations, depending mostly on job-situation since very few scheduled caste people own even small tracts of land. Highest concentrations are found near the townships, an obvious result of the pull force exerted by the bidi-industry. The over-all percentage of scheduled castes is explainable by the fact that the region is primarily wheat-producing and needs a large work-force of landless labourers.

This region seems to be one of the least literate ones in the whole country. Though the literacy-figures for this region have been consistently higher than the State figures, they lag behind the national average. Even the urban literacy is only 58 per cent. Rural literacy is nearly 17 per cent, though this can be raised to 25 if only those above 10 are taken into account. An area dependent on subsistence agriculture can hardly spare its young population to go to school, much less the female children. Though per capita land availability is low, the terrain compels the farmers to mobilise as many members of their families as they can. Then, lack of accessibility has prevented the winds of change from reaching the countryside and level of aspirations is woefully low even in
the cities. Yet, it is heartening to note that literacy has been picking up, particularly since 1951. The Western highlands have a higher female literacy than the region as a whole. The scheduled castes have done relatively better in this regard. In the final analysis, however, the fact remains that literacy and economy are mutually supportive.

A study of the nature and character of this region's workforce appears to indicate that it is not as active economically as some other parts of the State. Percentage of workers in total population is lower here than in the State as a whole. A large number of workers have to seek jobs outside the region while continuing living here. Both the fertile tracts of river uplands and difficult terrains of the Northern and the Southern highlands call for greater male-participation, rendering female-workers superfluous. Women workers are fewer in this region than the State average. Finally, it may be noted that there are more cultivators, marginal though these may be, than landless agricultural labourers in this region. Though there are more women agricultural labourers, their overall percentage is less because men dominate among cultivators.

AGRICULTURAL SITUATION:

Land utilization data hardly provides a coherent picture since the region lacks uniformity. On one hand are the fertile uplands of the rivers, on the other are the lower and upper Vindhyans stretching like a wall, particularly in the
Northern and the Southern highlands. These are the areas with the bulk of forested tracts belonging to this region. Forests are, however, all over the region except the Sonar upland and the areas near Sagar city. Forests account for nearly 11 per cent of the region now, though there was a time when the region was predominantly forested. 10 per cent land is either barren and uncultivable or it is put to other uses like house-sites, roads etc. There are numerous patwari-circles in the Northern and the Southern highlands which have between 16 and 32 per cent or more of their land in this category. In the wheat-producing areas, however, the percentage is less than 4. Other uncultivated land (excluding fallow) occupies nearly 16 per cent of the total area. This category includes permanent pastures and grazing land and scrub jungles. Fallow land accounts for 4.5 per cent, including both the current fallow and the old fallow.

The remaining a little over 59 per cent of the total land forms the net sown area of this region. This is not a high percentage by current reckoning. Of this, only 2.75 per cent is double-cropped, reflecting the backwardness of agriculture and paucity of irrigation. In 18 per cent of patwari circles, belonging mostly to river uplands, the percentage of net sown area exceeds 80 while in another 25 per cent it ranges between 64 and 79. On the other extreme are the 10 per cent of patwari circles where net sown area is less than 32.

Nearly 90 per cent of the total net sown area in this region produces food crops: cereals, pulses and oil-seeds.
This is 3 per cent more than the State average. The Western highlands is known for mixed farming and is productive in both the seasons. The Sonar upland is primarily a rabi tract, though highly productive. The other segments are generally single-season tracts and not particularly productive. Wheat and jowar, by and large, are the staple foods in this region. A variety of coarse grains as well as rice are also produced.

Wheat, jowar, maize, rice, kodo-lunik and bajra are the principal cereals grown in this region. 56 per cent of the total net sown area is earmarked for this purpose. 37 per cent of it is under wheat, the main rabi crop, which is grown largely on the Western highlands and the alluvial river uplands. The average yield is 732 kgs per hectare, though this can be raised by the application of nutrients. Rice is grown on 11 per cent of the total net sown area, mostly in the Southern highlands during the monsoons. The Northern highlands produce mostly jowar and maize.

Pulses are grown on 23 per cent of the net sown area. Gram, lentil, tuar and teora form the bulk of pulse-cultivation, spread over both the seasons. Gram covers 12 per cent of the total net sown area, and is in the same areas where wheat is grown. Lentil covers 9 per cent of the net sown area. Pulses are also grown along with cereals and oil-seeds.

Several kinds of oil-seeds are grown in this region, the chief being linseed, ground-nut, gingelly-seed, niger-seed and mustard-seed. The local farmer is slowly realising the value
of oil-seeds as commercial crops and larger percentage of land is being assigned to them.

Podder crops are also grown in this region, though the area under them has dwindled in the past years. This may be due to fragmentation of holdings as well as rise in population. This trend cannot be considered healthy for animal husbandry.

In a region with limited irrigation facilities, the index of cropping intensity was bound to be low. It is only 106 for the plateau as a whole. Though these are otherwise better-off, the Western highlands have the lowest cropping intensity while the Northern highlands have the highest cropping index. The intensity can be certainly raised by providing better irrigation facilities. The Western highlands and the Southern highlands need fertilisers. Mixed and double cropping, going on on a very small scale, can be raised substantially.

As many as 10 different crop-combinations are in practice in this region, wheat-jowar and wheat-rice accounting for the bulk of them. Crop diversification is, however, only on a low and moderate scale in most areas. High crop diversification is confined only to the hilly terrain and sandy soil where only one crop is grown.

The average size of a holding is 3.6 hectares in Sagar and 3.8 in Damoh. Yet, the picture is not so simple, since 72 per cent of the total arable land is in the possession
of only 28 per cent land-owners. A vast majority of farmers have very little stake in the improvement, the size of their holdings being very small. Per capita availability of land is also quite high — .79 hectare as against the State average of .44 hectare. It is interesting to note that there are areas where population is sparse and yet per capita availability of land is low, as in the Northern and the Southern highlands and the hilly forested ranges of the Western highlands. This is owing to low percentage of net sown area in these segments. In the same way, some populated areas have high per capita land availability.

Only 5.68 per cent of the total net sown area in this region is irrigated by various means. This is much lower than the State's average of 10.7 per cent. On top of it, the proportion of irrigated area varies rather markedly from place to place, ranging between 1 and 73 per cent. Irrigation is by canals, tanks, reservoirs and wells. The water-table in some places is very low and tube-wells are not feasible in most parts. The productive Western highlands mostly depend on wells. There is one small dam on Bila river in the Northern highlands while the terrain facilitates the creation of tanks and reservoirs.

The region is as backward in animal husbandry as in agriculture. Though the number of animals is adequate, the yield is low. Pasturelands are insufficient for the animals. Both availability and consumption of milk, milk-products and flesh foods is rather low in this region. There is ample scope
for development in this vital sector provided the people concerned could be shown the benefits from it.

Pressure of population on agricultural resources is best reflected in the quantum of food-supply available to every consumer in a given region. A study of the data from this point of view reveals certain interesting and significant facts. According to the experts of the ICMR, a balanced diet for an Indian ought to consist of 400 gms cereals, 70 gms pulses and 15 gms fats and oils. Cereals have perforce to dominate the Indian diet. If one were to depend on the local produce, an inhabitant of this region is likely to remain deficient in cereals and oil-seeds but very well-off in pulses. Nearly half of the patwari circles do not grow enough cereals to provide the suggested average to their inhabitants. The situation in regard to fats and oils is worse. The region does not produce even oil-seeds in the required quantities. However, nearly five-sixths of the region produces enough pulses to provide more than the national average.

The picture changes when the quantities of foodstuffs are reduced into calories for the sake of measuring carrying capacity. Since the availability of pulses is ample and pulses are rich in calories and proteins, the standard nutritional unit (SNU) does not suffer due to want of cereals and oil-seeds. If one SNU is equivalent of 2200 calories, as it should be on various considerations, the region is not at all deficient. As many as 62 per cent of patwari circles are in a position to ensure a daily supply of 2501 to 3000 calories
or more to their inhabitants. In fact, only 62 circles out of 456 have less than 1 SNU while 86 have more than 1 SNU. Another 17 per cent have just sufficient availability of calories. Something has to be done only in the remaining 21 per cent patwari circles, one third of whom are excessively deficit. Cereals alone can provide the required amount of calories in nearly 48 per cent of patwari circles. Pulse-production, as we have seen, is considerably higher in this region. Only oil-seeds may go on posing a problem for sometime.

Future trends have been projected keeping all these facts in mind. Assuming that the population growth will be of the same order as obtained during the preceding two decades (1961-81), i.e., 2.6 per cent per annum, the population can be expected to rise to a little over 3.4 millions in the year 2000. The figure will come down if the computation is on the basis of the national growth rate. The arithmetic density, presently 114 persons per square kilometre, is likely to rise to 192 persons per square kilometre. 1 to 1.3 million more people will have to be provided for from the available resources. Does the region have the potentiality to meet this challenge?

Since the yearly data of agricultural production are available only from 1965-66, projections in this regard have been made on the basis of the growth rate obtaining from 1965-66 to 1977-78. The trend line drawn by extending the curve up to the year 2000 gives no basis for pessimism or alarm. The farmers of this region are alive to the problems, as is evident from
the shifts both in regard to the choice of crops and the net sown area assigned to them during the last years. Priorities have been reformulated again and again, and it can reasonably be expected that this healthy trend will continue. In fact, benefits from the latest researches have not fully percolated to the farmers in this region and the growth may be accelerated as and when this process is completed or accelerated. Already one can notice a shift to more profitable food-crops and commercial crops. Given will and means, there is still considerable scope for development and expansion.

In 1961, food-production was sufficient to provide more than 1 SNU per day per head in this region. There has been a slight decline in the following two decades because population grew at a faster pace than agricultural production. However, the trends clearly show that in 2000 the nutritional level may exceed 1 SNU substantially. Wheat-production is likely to go up by 108.3 per cent, that of rice by 60 per cent and of maize and barley by 50 and 1110 per cent respectively. There may be an addition of 90 per cent in the food-grain production as such. Over-all availability of foodgrains in 2000 is thus likely to be 490 gms per day or 1672 calories as against 430 gms or 1472 calories in 1980-81, an increase of 13.5 per cent in weight and 13.30 per cent in calories.

Projected growth of pulse and oil-seed production is far more remarkable: 229.2 and 683.2 per cent, respectively. Picture of per capita availability is, however, not so heartening. If the present trends continue, this region is likely
to become a major supplier of oil-seeds to other regions while its own per capita availability of pulses may considerably decline. This calls for planners' attention.

The region is not large enough nor is the time-span adequate to permit any definitive judgment whether the region is over-populated or not. As the things are at the moment, one may say that at least in parts it is an area of economic opportunity. In spite of its difficult terrain and less than kind natural conditions, the region has shown a remarkable ability to move with times, to produce more to provide for growing numbers. No calamity of the kind Malthus predicted has overtaken this region, though its population has grown at a faster pace than the country as a whole. By and large, and speaking roughly, the region appears to have lent credence more to the Boserup thesis than to that of Malthus. Growth of population has really goaded the local population to adopt modern agricultural techniques, witness the increase in numbers of tractors, tube-wells and other technical helps as well as in the use of chemical fertilisers, pesticides, etc. Addition of numbers has really made agriculture a far more paying proposition than ever before. A spurt in the population in the Southern highlands and the Sonar valley in recent decades only prove that these areas are getting over their earlier constraints. If this trend continues, the region might well become one of the less backward ones in the State.

All this, however, should not be construed as a plea
for unbridled growth of population. This is only a suggestion to see brighter side of population growth. In any case, the growth has not been unbridled so far and the likely improvement in literacy and other cultural fields will certainly help bring down the growth-rate. This improvement alone will ensure a raising of the level of aspirations also, which will in turn move people to go in for further modernisation. In this way, a spiral may hopefully form in which both agriculture and culture will promote each other.

Much can yet be done to both expand and intensity agriculture. Scope for expansion is limited only to fallow land and scrub jungles since the reduction in the area under forests or public utilities will be far from advisable. However, as much as 9.4 per cent of the total land can yet be brought under the plough provided the necessary inputs can be arranged.

Wherever agriculture appears to be failing to keep up with the rising numbers, the stock suggestion is to stop depending on agricultural and to go in for industrialisation. However, anyone acquainted with the local conditions would see the futility of this suggestion. As long as bidi-industry is flourishing in this region — and there is no reason to think that it will decline in foreseeable future — no other industry can be profitable in this region. Rolling of bidis is basically a cottage industry in which women and even children can make good deal of money without putting in too much
Straining labour and without even leaving their homes. In most cases some members of a family engage in agriculture, petty trade or service while others stay back and roll bidis. The areas near townships in particular are oriented to this pattern of life. If this has to be prevented from proliferating, ways must be found to make agriculture, particularly in the far-flung areas, more attractive and paying. Though remunerative in short-run, bidi-making is really harmful for health and causes several social problems. The future of this region is in agriculture and agriculture alone.

Conclusions:

1. The Sagar-Damoh plateau is one of the less populated parts of India. The quality of life of the population is poor in many ways and this has affected both the level of production as well as of consumption.

2. In accordance with the hill and dale topographic making of the region, the agricultural landscape is also quite varied. Agriculture is cereal-oriented in the main, though there is a growing trend in favour of increasing the cultivation of such cash crops as oil-seeds. (Diagram III).

3. Most of the cultivable land is already under plough. Possibilities of expansion exist only on a little over 8 per cent of the total area. Prospects of adding to the farmland are thus admittedly not bright.

4. This region is among the surplus areas in regard to agricultural produce. Even though the carrying capacity of the agricultural land is high, there are conspicuous spatial
variations. The low-lying valley tracts and parts of the Western highland have greater foodgrain availability than the rest of the region.

5. Even though the region is overall an area of economic opportunity, intra-regional micro-scale areas of economic stress also exist. This is brought out by the population movement from less productive hilly areas to the more productive lowlands, revealed by the spatial pattern of population growth.

6. The surplus food growing areas exhibit a close concomitance with the areas of greater population concentration. The less populated areas are by and large also deficit in foodgrain availability. This seems to lend credence to the thesis of Roperup which emphasises the population stimulates agricultural growth. The experience of this region suggests that in a predominantly agrarian system with a potential of economic opportunity, the Roperup thesis seems more valid than that of Malthus.

7. The region possesses substantial potential for enhancing its food production. The per cent SWI is much higher than in many other parts of the country. Though limited, there are possibilities of enlarging farmlands. Extension of modern means for developing agriculture, like irrigation, fertilisers, improved seeds, etc. are likely to revolutionise the whole agricultural system in this region. Animal husbandry, pisciculture and horticulture can also be developed on a significant scale.
PROBLEMS AND SUGGESTIONS:

Among other things, the following suggestions deserve serious consideration:

1. The first and foremost need is to improve the accessibility of the region. Agriculture cannot be modernised nor can it be made remunerative when 30 per cent villages are far from even ordinary roads. On one hand is the difficulty in carrying modern equipments and inputs to these villages, not to speak of providing them with basic necessities like education and medicare. On the other are the problems connected with the carrying of the surplus produce to the nearby markets. The region can not go in for commercial crops in a large way as long as this difficulty is there. It is true that in some parts the terrain does not facilitate the building of metalled roads but this is not so all over the region. There is no doubt that the region under study has suffered both because of inclement nature and an indifferent administration working on wrong priorities.

2. Irrigation facilities can and must be expanded. The fertile Western highlands can be made much more productive if a series of tube-wells could be erected there. The watertable is relatively high and the soils have the capacity to retain water. The State is busy acquiring power-generation capacity from super-thermal power stations these days. Only a fraction of this can energise the required number of tube-wells. In the second place, small dams like the one on Bila
river in the Northern highlands are feasible on several other rivers and rivulets in the region. The region is really rich in potential for small and medium irrigation projects. The rocky terrain is considered good for building reservoirs and the short-distance canals that will be dug to carry the water to fields will not absorb too much water. Lastly, the hilly terrain of the Southern highlands has brought into existence several small reservoirs. These meet only a small proportion of water needs of the region. Such reservoirs can be constructed according to a plan without spending too much money, labour in view of the nature of the terrain.

3. The nature of terrain appears to suggest one other change in the existing situation. Terrace-farming, particularly of paddy, has been found very profitable in Japan, Taiwan, South Korea and in the North-eastern States of India. The Southern highlands seem to have similar conditions. Terracing of small tracts on steep slopes helps retain water, prevents the run-off of valuable nutrients and may even do something about soil erosion.

4. Little attention is paid to the type of seeds supplied to the farmers. Introduction of high-yielding varieties is welcome but some segments of this region need seeds which can do well without much watering. Several agricultural research institutes, particularly the Central Arid Zone Research Institute of Jodhpur, have been busy experimenting with seeds of this nature. Regrettably the local officials of the
Department of Agriculture have not taken much interest in bringing and acclimatising of such seeds. It would be a good idea to find out if the tracts left fallow due to shortage of water can do with such seeds.

5. Last but not least, the local farmers must be enthused to take greater interest in the improvement of their condition. It is undeniable that the ridiculously small size of most holdings hardly leave any scope for qualitative improvement. Mechanization is feasible only on a moderately sized farm. There is no alternative to an honest and rigid implementation of the ceiling laws. If the holdings go on fragmenting at the current rate, the day is not far when agriculture will cease to be a profitable venture for a large number of cultivators.

The qualitative characteristics of population and level of social well-being before any long-term strategy for augmenting food production may succeed. Since level of social well-being affects both production and consumption, necessity to adopt improved agricultural technology can not be created in the present conditions.