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into permanent and hired labour and such items as irrigation, farmyard manure, capital, etc., which constituted resource restrictions were contained in these tables. A particular resource may be a variable input for an activity, yet it could be and often is a fixed resource for the total farm organization. Examples are capital, irrigation, labour, etc.

Desai also raises a question on irrigation capacity which we have confined to the period April to early July. His objection is that in other parts of the country irrigation might be a restriction in other seasons also. We do not deny this. But since we were working with the conditions obtaining in the Punjab, it would be a natural thing to do to spell out only such irrigation constraints which were applicable to this situation.

Again, to the objection that the figures under the irrigated-unirrigated categories of land do not tally with the total land fit for growing of crops, it is important to appreciate that the total land may not be fit for growing of crops. Some areas might be low lying or might not be cropped due to some other reasons. When a situation is averaged over a large number of holdings, this difference in the total cultivated land and the land available for growing of different crops could occur. There is, however, a typographical error on page 31, *i.e.*, (7.70—1.14= 6.56 acres and not 6.29 acres). Such typographical errors are regretted.

We agree with Desai's comments that uniform notations could be used on the cost minimization problem. But this does not alter the solution of the problem. Moreover, wherever different notations were used, they were explained in the immediately following paragraph and no confusion could possibly arise on this account to the reader.

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QUANTITATIVE DELIMITATION OF AGRICULTURAL REGIONS IN INDIA*

In an article on "A Regional Approach to Agricultural Development in India—Some Preliminary Results,"[1] an attempt had been made to delineate agricultural regions by grouping districts in various States on the basis of composite land resource indices, worked out by giving decile rankings and some weightage to selected indicators, *viz.*, (*i*) gross area irrigated as per cent of gross area sown, (*ii*) average annual rainfall, (*iii*) extent of cultivated area, (*iv*) intensity of cropping, (*v*) soil characteristics like topography, texture, etc., (*vi*) gross area sown per capita. The indices for district by district composite decile ratings were worked out by taking the lowest composite decile ratings for 10 districts located in Gujarat, Kerala, Madhya Pradesh, Maharashtra and Rajasthan equal to 100. These land resource indices were also compared with composite productivity of rice and wheat district by district.

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* The author is grateful to Shri J. S. Sarma, Joint Commissioner in the Ministry of Food and Agriculture, Government of India for suggesting various improvements in the original draft. Personal views alone are expressed here.

1. *Indian Journal of Agricultural Economics*, Vol. XIX, No. 1, January-March, 1964, pp. 176-192.

In the present revised exercise, the delineation of agricultural regions is again based on composite land resource indices, which, in turn, have been worked out on the basis of decile ranking approach. The difference in the present land resource indices compared to the previous one arises on account of (*a*) different weights assumed for the selected indicators and (*b*) shifting the base from the average of 10 lowest composite decile ratings to an all-India average. The revised weights for the selected indicators and their basis are given below :

Indicators	Weights	Remarks
1. Area cultivated as per cent of total reporting area (1960-61)	1.0	
2. Gross area sown per capita (1960-61)	1.0	No weightage has been given for the amount of area sown per capita. The differences in the quality of area have been taken into account under rainfall, irrigation and soil characteristics.
3. Average annual rainfall (1959-62)	Up to 30″=1.0 Between 31″–74″ =2.0 75″ & above=1.5	Areas having rainfall up to 30″ have been considered to be dry areas. Areas having rainfall between 31″-74″ have been considered to be assured rainfall areas good for multiple cropping and hence a weightage of 2.0 has been assumed. Rainfall beyond 74″ has been considered relatively less beneficial and, therefore, 1.5 has been assumed as the weight.
4. Gross area irrigated as per cent of gross area sown (1960-61)	2.0	Based on the rough order of difference in the per acre yield rates between irrigated and unirrigated areas.[2]
5. Intensity of cropping (1960-61)	1.0	No separate weightage for double cropping has been assumed because the necessary account for difference in the quality of land has already been taken care of under irrigation and rainfall categories.
6. Soil productivity ..	1.5	In order to isolate the impact of the quality of soil reflecting the fertility and chemical contents, a weightage of 1.5 has been assumed.

On the basis of the weights indicated above, decile rating for each of the 6 indicators have been combined for each of the districts studied in order to arrive at composite decile ratings. The composite decile ratings based on the selected 6 indicators have been assumed to reflect the land resources in each of the various districts. In order to assess the relative level of land resources in various districts of India, average all-India composite decile ratings have been worked out and taken as the base (=100) for constructing composite land resources index for all the districts in the 15 major States of India. On the basis of the land resource indices, the agricultural regions of India have been delineated and the results are summarized below.

While agricultural regions have been delineated on the basis of land resource indices explained above, account has also been taken of the per acre gross value

2. D. R. Gadgil : Economic Effects of Irrigation, Gokhale Institute of Politics and Economics, Poona, 1948.

productivity (exclusive of value of by-products) based on 20 crops for the triennium 1959-60 to 1961-62. The 20 crops considered here for the purpose of studying the relative productivity levels are rice, wheat, jowar, bajra, maize, barley, *ragi*, gram, *tur*, linseed, sesamum, rapeseed and mustard, castorseed, groundnut, sugarcane (in terms of *gur*), cotton, jute, sunhemp, mesta and tobacco. For the purpose of valuation of production of 20 crops, weighted all-India harvest prices were used, the Statewise production being the weights for each of the various crops. In the case of crops where harvest prices were not available, wholesale prices in the peak marketing season were used. Uniform weighted prices were used for a particular crop over districts. For getting the gross value of production for 20 crops for each of the 300 districts, the average production during the triennium 1959-60 to 1961-62 was multiplied by the all-India weighted prices for each of the 20 crops in a district and this was divided by the average gross area sown (1959-60 —1961-62) under these 20 crops for getting the per acre gross value productivity. Thus :

$$Y_d = \frac{\sum_{j=1}^{20} q_j \left\{ \sum_{i=1}^{15} \frac{p_{ij} \; w_{ij}}{\sum_{i=1}^{15} w_{ij}} \right\}}{\sum_{j=1}^{20} a_j}$$

Where Y_d =per acre gross value composite productivity (20 crops) for a district.

q_j =average gross physical production for a crop (j), during the triennium 1959-60—1961-62 for a district.

p_{ij} =annual harvest price for a crop (j) in a State (i) for 1960-61.

w_{ij} =average gross production for a crop (j) in a State (i).

a_j =average gross area sown (1959-62) for a crop (j) in a district.

After working out the per acre gross value productivity, district by district, the indices of per acre productivity, like the land resource indices, were worked out taking the average all-India per acre gross value productivity as the base (=100).

For the purpose of evaluating the status of different regions, the indices of land resources and productivity have been classified under the following heads:

Land resource indices	*Crop productivity indices*
Very Low : Less than 50	Less than 50
Low : 50—75	51—100
Medium : 76—100	101—150
High : 101—150	151—200
Very High : 126—150	201+

Table I presents the maximum and minimum levels of land resource indices and composite crop productivity indices observed in various districts of India.

TABLE I—MAXIMUM AND MINIMUM LEVELS OF LAND RESOURCE INDICES AND CROP PRODUCTIVITY INDICES (ALL-INDIA INDICES = 100)

States	Land resources		Crop productivity	
	Maximum	Minimum	Maximum	Minimum
Andhra Pradesh ..	126 (W. Godavari)	84 (Chittoor)	216 (E. Godavari)	66 (Adilabad)
Assam ..	118 (Nowgong)	69 (Sibsagar)	203 (Nowgong)	118 (Kamrup)
Bihar ..	136 (Shahabad)	84 (Saharsa)	174 (Dhanbad)	81 (Palamau)
Gujarat ..	91 (Surat)	60 (Kutch)	194 (Surat)	37 (Banaskantha)
Jammu & Kashmir ..	104 (Jammu)	63 (Doda)	160 (Anantnag)	67 (Poonch)
Kerala ..	123 (Trivandrum)	70 (Kozhikode)	238 (Kottayam)	162 (Kozhikode)
Madhya Pradesh ..	134 (Balaghat)	58 (Jhabua)	127 (Bastar)	57 (Rajgarh)
Madras ..	137 (Thanjavur)	79 (Tirunelveli)	255 (Kanya Kumari)	127 (Ramnad)
Maharashtra ..	118 (Bhandara)	69 (Buldhana)	194 (Kolaba)	48 (Wardha)
Mysore ..	126 (Shimoga)	70 (Gulbarga)	299 (Coorg)	31 (Bijapur)
Orissa ..	126 (Bolangir)	76 (Koraput)	151 (Ganjam)	105 (Baudh Khondhmals)
Punjab ..	148 (Ferozepur)	36 (Lahul & Spiti)	158 (Ludhiana)	45 (Lahul & Spiti)
Rajasthan ..	117 (Bharatpur)	44 (Jaisalmer)	99 (Udaipur)	11 (Bikaner)
Uttar Pradesh ..	138 (Sharanpur)	81 (Almora)	214 (Muzzaffarnagar)	70 (Bahraich)
West Bengal ..	148 (Birbhum)	86 (24-Parganas)	223 (Hooghly)	127 (Malda)
15 States ..	148	36	299	11

It may be pertinent to mention that land resources may not always be reflected in composite crop productivity because of the heterogeneity in the utilization of resources and their availability as also the risk and uncertainty involved in climatic conditions. The actual pressure of population on land, untimely rainfall, non-availability of credit facilities and late ploughing or similar disturbances in some agricultural operations may lead to the deviations in the results. Keeping in mind this broad limitation, we may proceed for a study of agricultural regions first within administrative boundaries of States and then over States. The agricultural regions have been considered on the basis of 1961 Census zones. These zones are as follows :

1. Northern Zone : Jammu & Kashmir, Punjab, Rajasthan, Delhi, Himachal Pradesh.
2. Central Zone : Uttar Pradesh, Madhya Pradesh.
3. Eastern Zone : Bihar, Orissa, West Bengal, Assam, Manipur, Tripura, North East Frontier Agency, Nagaland, Sikkim.

4. Western Zone : Gujarat, Maharashtra, Dadra and Nagar Haveli.

5. Southern Zone : Andhra Pradesh, Mysore, Kerala, Madras, Pondicherry, Laccadive, Minicoy and Amindivi Islands.

Areas which have not been included in any Zone: Andaman & Nicobar Islands and Goa, Daman and Diu.

NORTHERN ZONE

1. Jammu & Kashmir

On the basis of land resource indices, the State of Jammu & Kashmir has been divided into four broad agricultural regions. The regions consisting of Jammu and Kathua is showing high land resources. Barring Doda, the rest of the districts fall in the medium category of resources. As against this, the districts of Anantnag, Srinagar and Baramulla are having relatively high productivity indices compared to resource indices and, specifically speaking, Anantnag falls in the high productivity group and Baramulla and Srinagar in the medium category. The rest of the districts are having productivity levels in the low group of productivity.

2. Punjab and Haryana

The agricultural regions formed by the group of districts like Amritsar, Ludhiana, Ferozepur running through Bhatinda down to Hissar is perhaps the best agricultural region of the Punjab and Haryana and perhaps of India and high value productivity crops of wheat and cotton are grown here. In fact, the highest productivity levels are observed in these set of districts in the whole of North Zone. The hilly districts of Lahul & Spiti and Simla come under low and very low resource group, though from the point of productivity, Simla falls in the medium group. Punjab and Haryana are one of the fertile areas of India and has in their domain alluvial soil which is rich for the growth of wheat, gram and rice. In fact, in productivity, these areas are richer than any other part of the northern region and it so appears that the productivity levels observed in this region tend to decline as one proceeds towards south-east through the western and central U.P. plains. The districts comprised of Gurgaon, Mahendragarh represent the backward region of the Punjab and therefore both resource and productivity indices are comparatively low in these districts. The extension of Bhakra Nangal irrigation to this region will perhaps change this part into a prosperous area.

3. Rajasthan

Rajasthan has about eight agricultural regions on the basis of land resources. The most prosperous region is represented by the districts of Ajmer, Bhilwara, Pali, Udaipur and Chittorgarh as also Alwar and Bharatpur. From the point of view of productivity, practically all the districts are relatively backward excepting the districts of Dungarpur (99), Udaipur (99), Bundi (79), Banswara (84), S. Madhopur (74), Chittorgarh (79) and Bhilwara (84). Most of these districts fall in the productivity range 75-100 which represents low productivity group. In none of the districts, the productivity exceeds the all-India productivity. It touches very near the all-India productivity in the districts of Dungarpur and Udaipur. In most of the districts of Rajasthan, the average size of

holding is relatively high but the land is of poor quality. The availability of red and black, desert soil, brown, red and yellow soils, with relatively less rainfall and low percentage of irrigation are good only for the growth of inferior grains and therefore both the physical and gross value productivity is relatively low. In some of the recently developed parts like Ganganagar, the yield is still below the all-India average yield, as it will still take some time to tap the irrigation potential created there.

CENTRAL ZONE

4. Uttar Pradesh

On the basis of land resource indices, Uttar Pradesh can be delineated into eight agricultural regions. Relatively speaking, Western Uttar Pradesh represented by the districts of Saharanpur, Muzaffarpur, Meerut, Bulandshahr, Aligarh, Etah, Mainpuri represent the best agricultural region in the whole of Uttar Pradesh and this is reflected by very high productivity levels and very high land resources in many of the districts in this tract of Uttar Pradesh. Another good agricultural region from the point of view of availability of land resources is found in Eastern Uttar Pradesh and is represented by the districts of Gonda, Basti, Gorakhpur, Deoria, Azamgarh, Barabanki. These districts are relatively better from the resource point of view, yet from the point of view of productivity, there seems to be under-utilization of agricultural resources in this part. Broadly speaking, it has been observed that both resources and productivity decline from Western Uttar Pradesh to Central Uttar Pradesh and again in Eastern Uttar Pradesh, though the resources in some of the districts again go up, productivity tends to decline in the Indo-Gangetic belt. However, within the same region, say Western Uttar Pradesh, composite crop productivity tends to decrease from north to south. Thus, productivity tends to decrease from Muzaffarpur and Saharanpur towards south. One of the possible reasons might be the commercial bias represented mostly by sugarcane cultivation. This region is also relatively prosperous because of agro-based industries which have developed around this region. Relatively speaking, though Eastern Uttar Pradesh has sugarcane cultivation, yet there are frequent floods and drought almost every year and because of relatively less commercialized cultivation, the region on the whole happens to be backward and hence there is a great need for establishing agro-based industries in this part of the Indo-Gangetic belt.

5. Madhya Pradesh

Madhya Pradesh could be divided into nine agricultural regions on the basis of availability of land resources. The region formed by the group of districts falling in South-Eastern Madhya Pradesh, *viz.*, Balaghat, Durg, Raipur, is perhaps the best agricultural region. The crop productivity is also relatively medium in this region. The high productivity (almost all-India average) observed in these districts get extended towards Bastar, Raigarh, Bilaspur, Surguja, etc. In these set of districts, the high productivity levels might partly be explained by the high valued crop of rice which is grown over red and yellow soil.

The most backward agricultural region of Madhya Pradesh seems to be located in the Central Madhya Pradesh. In this part both land resources and crop productivity indices are relatively low. The low productivity is partly explained by low valued crops like jowar. Wheat and cotton are other crops grown here but the proportion of area under each of these crops is rather insignificant. Medium black soil is prevalent here.

WESTERN ZONE

6. Gujarat

Gujarat could be divided into five agricultural regions. The Saurashtra region formed by the districts of Jamnagar, Rajkot, Surendranagar, Amreli, Bhavnagar and Junagadh is relatively backward both in respect of land resources and crop productivity. Groundnut, jowar and bajra being low valued crops perhaps deflate the per acre gross value productivity indices for these districts. The soil types in this region are deltaic alluvial, coastal alluvium and medium black.

Regions three and four constitute the Gujarat area. The northern districts of Banaskantha, Sabarkantha, Mehsana and Panchmahals are relatively backward both from the point of view of land resources and crop productivity, as compared to the southern districts of Kaira, Baroda, Broach and Surat. The medium black soil and coastal alluvium prevalent in the southern districts seem to be favourable for high value productivity crops like cotton, rice. Thus the per acre gross value productivity index for Surat, Kaira and Baroda are 194, 139 and 111 respectively. Productivity in Broach perhaps gets deflated due to cotton-jowar combination.

7. Maharashtra

Maharashtra could be divided into six agricultural regions on the basis of land resources. From the point of view of land resources, the region formed by the districts of Nasik, Ahmednagar, Poona, Dhulia, Jalgaon, Aurangabad, which fall in the Deccan and Marathwada areas having medium and deep black soil is perhaps the best region. However, the per acre gross value productivity index is not very high, because the crop pattern is oriented towards jowar, bajra and groundnut complex. From the point of view of productivity, Konkan area (Thana, Kolaba, Ratnagiri), Deccan (Kolhapur) and Vidarbha (Bhandara) seem to be the best. Perhaps, the cultivation of rice and cotton in these districts, as against jowar, bajra, groundnut combination in other districts explain their superiority in productivity.

SOUTHERN ZONE

8. Andhra Pradesh

In Andhra Pradesh, four agricultural regions emerge on the basis of land resources. The best agricultural region is formed by the coastal districts which are having both high resources and high productivity. The relatively backward region seem to be located in the central part of Andha Pradesh, formed by the districts like Mahbubnagar, Nalgonda, Khammam, etc. Guntur though included in this region is an exception from the point of view of productivity. In the Southern Andhra Pradesh, though the resources are relatively high, yet these are not reflected in high productivity levels and therefore need investigation.

9. Mysore

Mysore could be divided into four agricultural regions. The best agricultural region from the point of view of land resources is formed by the districts of Shimoga, Chikmagalur, Hassan and Mandya having red and laterite soil (Central Mysore).

These districts are also having relatively high value productivity due to rice-*ragi* crop complex. The best set of districts from the point of view of value productivity are located in the South-Western portion, represented by the districts of South Kanara, North Kanara, Coorg and Mysore having rice as the major crop grown on laterite and coastal alluvium soils.

The districts located in Northern Mysore and South-Eastern portion are having relatively less land resources along with relatively low productivity. The crops grown in North Mysôre are jowar, bajra, groundnut and cotton on deep black, medium black, mixed red and black soils. In the South-Western portion, *ragi*, rice, groundnut seem to be the common crop combinations grown on red soil.

10. Kerala

Kerala can be divided into four agricultural regions on the basis of land resources. High land resources seem to be located in Trivandrum. Trivandrum, Kottayam and Palghat are having very high productivity levels as against the relatively low productivity levels in Cannanore, Kozhikode and Trichur. High value productivity levels of rice might explain the high productivity in these areas, in the background of a mixture of soil types like coastal alluvium, lateritic, laterite and forest. Rich growth of coconut and tapioca is the special feature of these districts. It may, however, be pointed out that the land resources and land productivity cannot strictly be compared in Kerala, because of the inclusion of the various land resources on the side of resources, but on the productivity side the output on account of plantation crops has been excluded and since Kerala is an important plantation area, this exclusion might deflate the per acre productivity and therefore these indices are not as realistic in Kerala (as is also the case in Assam) as in the case of other States where the plantation crops' role is rather insignificant.

11. Madras

Of the two agricultural regions in Madras, high land resources are observed in the Coromandal coastal districts like Chingleput, South Arcot, North Arcot and Thanjavur. Productivity also happen to be high in this belt. In the inland Madras districts, land resources and productivity fall in the medium category barring Kanya Kumari which is having very high land resources and productivity.

EASTERN ZONE

12. Orissa

Of the three agricultural regions, the Coastal Region, though has relatively less land resources, yet contains best productivity districts. Resources are high in Western Orissa, but the crop productivity in some of the districts (B. Khondamals, Kalahandi) is relatively low and therefore needs investigation.

13. Bihar

Relatively high resources have been observed in Shahabad, Gaya and Patna. But the productivity levels are relatively low. These cases need careful investigation. On the whole, there seems to be declining trend in productivity with the increase in resources. How far this situation is explained by the annual recurrence of floods and drought in Bihar, needs detailed surveys and investigations.

14. West Bengal

It may be observed that in practically all the districts of West Bengal, the productivity indices exceed the resource indices. High productivity indices are observed in the Himalayan West Bengal as also in the Gangetic West Bengal. The Western West Bengal, through which flows the Ganges is, of course, having high land resources along with high productivity.

15. Assam

High agricultural resources seem to be located in U.K. & J. Hills and Nowgong along with high productivity.

Now it is proposed to study the agricultural regions over States, ignoring State boundaries.

I. Eastern Coastal Region

The Eastern Coast commencing from Kanya Kumari in the south to Midnapur and Hooghly in West Bengal in the east reveals, by and large, high land resource indices, which are higher than the all-India average. This region which is formed by the coastal and adjoining districts is principally a rice growing tract and is relatively richer in resources as compared to the Western Coast. Here it may be of interest to note that, relatively speaking, Coromandal coastal districts as also Andhra coastal districts are richer in land resources compared to Orissa and West Bengal coastal districts.

The superior position of the Eastern Coastal districts in terms of land resources is also reflected by the relatively high productivity indices. Productivity is more or less in harmony with the resources. The coastal alluvium, alluvial and red soils prevalent in the Eastern Coastal districts are favourable for high productivity of rice and other high valued crops.

II. The Western Ghats and Coastal Region

The Western Ghats and Coastal Region starting from Trivandrum in the south to Kutch in the north-west have relatively less land resources than its counterpart—Eastern Coastal region, barring some districts of Kerala (Trichur, Ernakulam and Trivandrum). The overall picture shows that this region is having medium category of land resources. The coastal districts of Gujarat contain less land resources than the coastal districts of Maharashtra (Konkan division) which in turn lags behind the Malnad districts of Mysore. These districts are ultimately excelled by some of the districts of Kerala like Trichur, Ernakulam and Trivandrum. Thus, broadly speaking, as one traverses from north to south in this region, one witnesses greater availability of land resources.

Broadly speaking, the overall, productivity levels in Western Ghats specially in the southern part of it, are comparable to the levels of productivity in the Eastern Coastal districts. However, the coastal region of Kutch and Saurashtra are backward in productivity owing to scanty rainfall. In Saurashtra and Kutch, the percentage of area irrigated to gross area sown is very low. Kutch, being mainly a jowar-bajra producing area, gets productivity levels deflated due to the inferior cropping pattern.

III. Maharashtra (except Konkan Division), North Mysore and Telengana Region

This region has, on the whole, medium land resources, though there are exceptions like Warrangal, Medak, Nizamabad and Karimnagar, having resources above all-India average. Further, within this region, the group of districts in Maharashtra and North Mysore, running parallel to coastal districts (Dhulia, Jalgaon Nasik, Aurangabad, Ahmednagar, Poona, Satara, Sholapur and Belgaum) are having relatively high resources, compared to the rest of the districts of Maharashtra and Mysore (Amravati, Akola, Yeotmal, Parbhani, Nanded, Bidar, Gulbarga, Bijapur, Raichur, etc.). Further, within each of the three sub-regions in this region, *viz.*, (*i*) the districts of Maharashtra and North Mysore running adjacent to the coastal districts, (*ii*) rest of the districts of these States, (*iii*) Telengana districts, land resources tend to decline from north to south.

In this region, productivity is, on the whole, low. It is particularly very low in North Mysore (Bijapur and Gulbarga). Productivity levels are relatively high in Telengana compared to the Deccan, Marathwada and Vidarbha areas of Maharashtra.

IV. Southern India (Other than Coastal Areas, North Mysore and Telengana)

This includes Southern Mysore, Rayalaseema (Andhra Pradesh) and inland Madras. The districts of Southern Mysore located along the coastal areas of Mysore (Shimoga, Chikmagalur, Hassan and Mandya) have the highest level of land resources in this region, followed by the districts of Rayalaseema and inland Madras. But productivity is the highest in the inland Madras district, followed by the districts of Southern Mysore and Rayalaseema. The discrepancy between the relatively high land resources and the relatively low crop productivity in Southern Mysore merits serious attention.

V. North Gujarat and Rajasthan Dry Area Region

This region is composed of cotton, groundnut and bajra growing districts of Gujarat and Rajasthan and is inclusive of districts like Banaskantha, Sabarkantha, Panchmahals, Mehsana, Surendranagar in Gujarat and Ganganagar, Churu, Bikaner, Jaisalmer, Barmer, Jodhpur and Nagaur in the desert areas of Rajasthan (Western). The districts falling in the desert areas of Rajasthan are more backward with regard to the availability of land resources. The alluvial and medium black soils of Gujarat, where cotton, jowar, bajra and groundnut are the major crops, yield an average value productivity per acre lower than the all-India average. The average gross value productivity per acre is much lower than the all-India average in the desert areas of Rajasthan.

VI. Eastern and South-Eastern Rajasthan

This region which combines Eastern Rajasthan plains, South-Eastern plateau and hills has land resources exceeding the all-India average or very near the all-India average. The alluvial, red and yellow, mixed black and red soils of the region principally grow gram, bajra, maize and jowar. The average productivity levels are, however, much lower as compared to the land resources in many districts located in Eastern Rajasthan and this needs careful examination. The productivity

levels come up only in the districts of Udaipur, Chittorgarh, Banswara and Dungarpur. Perhaps, the low value crops like bajra and jowar partly explain the situation.

VII. Chambal Ravines and Uttar Pradesh Plateau and Hills

This region is demarcated by the Chambal river in the west and is comprised of Gwalior, Bhind, Morena, Datia, Tikamgarh, Chhattarpur (Madhya Bharat Low Lands) and Jhansi, Jalaun, Banda and Mirzapur districts of Uttar Pradesh. In most of these districts, both the land resources and productivity are below the all-India average, barring Gwalior where land resources and productivity levels are above the all-India average.

VIII. Madhya Pradesh (except South-Eastern Portion—Chatisgarh Plains and Madhya Bharat Low Lands)

In this region, land resources are below the all-India average and pertain to the medium category. The level of land resources is relatively higher in the districts of Seoni, Chhindwara, Narsimhapur, Hoshangabad and Betul. As against this, the crop productivity levels seem to be higher in the east and tend to decrease as one proceeds towards west. The discrepancy in the availability of land resources and productivity requires examination.

IX. South-Eastern Madhya Pradesh and Orissa Inland

This region consists of Bhandara district of Maharashtra, Surguja, Raigarh, Bilaspur, Durg, Balaghat and Bastar of Madhya Pradesh and inland Orissa. This region has, by and large, resources and productivity exceeding the all-India average. Broadly speaking, both tend to increase as one moves towards the east, *i.e.*, inland Orissa. The red, yellow, mixed red and black soils are yielding relatively high productivity per acre.

X. Assam

Assam can broadly be divided into two broad regions (1) Western Assam plains and hills (Goalpara, Kamrup, Darrang, Nowgong, Garo Hills, U.K. & J. Hills), (2) Eastern Assam plains and hills (Lakhimpur, Sibsagar, U. M. & N. C. Hills, Cachar and Mizo Hills). Relatively speaking, the Western Assam commands higher land resources. But from the point of view of per acre crop productivity, Eastern Assam is having higher productivity levels. In other words, the productivity levels along with Brahmaputra river seem to be relatively less compared to land resources. This might be because of the annual recurrence of floods in these districts. But this aspect requires detailed examination.

XI. Northern Himalayan Region

This comprises Jammu & Kashmir, Himalayan Division of Punjab, the Kumaon Hills and Uttar Khand Division of Uttar Pradesh. This region, on the whole, has medium land resources, but the productivity levels are relatively high. Rice, maize and wheat are the major crops of the region.

XII. Punjab, Uttar Pradesh and Central Western Bihar Plains

This region presents more homogeneity with regard to land resources and has high land resources falling as it does in the Indo-Gangetic belt. The alluvial soil is rich for the growth of wheat, gram and rice. In per acre crop productivity, Western Punjab and Western Uttar Pradesh are richer than any other part of this region. Indeed it so appears that the per acre value productivity tends to decline as one proceeds from Western Uttar Pradesh to Eastern Uttar Pradesh. This feature is also discernible with a sub-region (Western Uttar Pradesh) where the value productivity decreases as one moves from north to south.

XIII. Northern Bihar and North-Western Bengal Plains

This region includes Saran, Champaran, Muzaffarpur, Darbhanga, Saharsa, Monghyr and Purnea districts of Bihar and Himalayan West Bengal (Darjeeling, Jalpaiguri) as also Malda and West Dinajpur districts of West Bengal. The entire region has land resources varying from medium to high levels, but with regard to per acre value productivity, Northern Bihar is relatively more backward than the Northern West Bengal. Rice is the major crop and soil is alluvial.

XIV. Chota Nagpur and West Bengal Plains

With high land resources and high value productivity per acre, West Bengal Plains maintain their supremacy over Chota Nagpur Division of Bihar. The fertile alluvial soil of West Bengal in contrast with the red soil of Chota Nagpur Division might be one of the factors responsible for its superior position in per acre value productivity. It has to be examined as to how far lack of flood control and soil conservation measures are responsible for relatively lower levels of value productivity in Chota Nagpur Division.

This exercise has shown that by studying the relative position about the availability of land resources and the composite productivity levels, it is possible to pinpoint areas where there is a scope for further exploitation of the available resources. The importance of such studies is greater in the present context when emphasis has shifted to area planning at lower levels like districts, blocks, etc.

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