Trans. Inst. Indian Geographers
Vol. 7, No. 2 July 1985

FUNCTIONAL HIERARCHY OF RURAL CENTRAL PLACES IN THE HIMALAYA – A CASE STUDY

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ABSTRACT : In the present study attempt has been made to investigate the central place system in district Pithoragarh of U. P. Himalaya. Out of the total 2152 inhabited villages of the district, 216 settlements were identified as rural central places. The study reveals that the spatial pattern of central places does not confirm to hexagonal latice arrangements due to the diversified topographic conditions of the region. The valley bottoms and ridge tops concentrate 40 per cent and 22 per cent central places while 38 per cent centres are found on mid-slopes.

INTRODUCTION

Although the study of central places and their hierarchical class system have been basically related to the Settlement Geography, it has gained renewed interest which followed largely from the successful application of such efforts to development planning. The classical central place theory developed by Christaller and Losch was theoretically examined by various western scholars. In Indian context, the subject received due attention and several Indian case studies were also conducted. So far as the Himalaya is concerned, there are only a few studies such as, Prasad (1976), Chand (1981), Maithani (1984), Chand & Thakur (1984) and Zutshi (1984).

The hilly nature of terrain with other topographic and climatic hardships and in collaboration with a complex and diverse settlement system have produced an interesting locational pattern of the services and the resultant spatial organisation of central places in the Himalaya. Therefore, the present study is undertaken with the following specific objectives:

i) To identify the rural central places and their spatial organization in the Himalaya.

ii) To find out the existing hierarchic patterns and their associated characteristics.

iii) To correlate some important factors with the central place system of the Himalaya.

THE STUDY AREA

District Pithoragarh is located between 29° 3' 45" and 30° 48' 30" North

Latitudes and 79° 48' 10" and 81° 5' 55" East Longitude and lies along the extreme east of the U. P. Himalaya. The region encompasses an area of 8856 sq. km. with a total population of 4,79,600 as per Census figure of 1981. It embraces a great geographical variety extending right from the outmost hill ranges of the Siwalik in the south to Trans–Himalayan border in the north – in between lying vast stratches under the Lesser and Greater Himalaya. The climate of the region varies from subtropical along the low lying valleys, temperate along the moderately high locations to a severely cold climate in the snow clad mountain ranges. Confirming to the intrensically unhospitable natural environment, the distribution of population over the region is very much uneven. Agriculture remains the principal economic activity which engages about 82.5 per cent of the population. The region is predominantly rural with only 3.8 per cent urban population. The settlements are generally very small in population size and occur in a limited settlement sites. The distibutional pattern of settlements, however, revealed a clustered pattern, concentration of population in these clusters has led to the concentration of socio-economic functions distributed rather unevenly.

IDENTIFICATION OF CENTRAL PLACES

In all the empirical central place studies, it is commonly agreed that a central place is an outcome of many functions, which provide the services to its surrounding region that gives it a certain degree of importance in relation to other places. Therefore, the availability of various services largely control the dependency of a large area on these focal points. The magnitude of the surplus or commodities, services or functions offered by a place to its tributary area is attributed to be the centrality of any centre. Precisely, the concept of centrality implies the extent, number, size, quality and quantity of the goods and services provided by the centre.

The centrality of a place can be measured to determine the central place status and various criteria have been evolved for the same. The commonly used methods are based on the assumption that higher the level of a service functions and functional hierarchy, higher will be the centrality of places. Many studies in India follow a qualitative approach of assigning weightage to different service functions but such a method of assigning arbitary scores has been held erroneous due to the subjected judgement of different workers. Among the most recent and quantitative approaches, the most suitable is that of Davies (1967 : pp. 61–79) who has calculated the location co-efficient of a single outlet of any functional type with the help of the following formula:

$$C = \frac{t}{T} \times 100$$

Where C = the location co-efficient of function

t = one outlet of function t

T = Total number of outlets of functions t in the whole system

Multiplication of the relevant location co-efficient by the number of outlets of each functional type present in a settlement gives the degree of centrality. A sum of 25 central functions forming six main groups have been selected from the entire region and data required for the study has been collected from district census hand books and directly from the concerned departments. The location co-efficient thus calculated for different functions are presented in Table 1. Further the central places were recognised from the matrix in which 734 settlements were found having any of these selected functions. The criterian that a settlement should fulfil the minimum re-

TABLE 1 : CENTRAL SERVICES AND SERVICE GROUPS WITH THEIR LOCATIONAL CO-EFFICIENT AND FREQUENCY OF OCCURRENCE IN THE AREA*

Service Groups		Services	Occurrence in the Area	Location Co-efficient per Unit
A. Educational Facilities	1.	Higher Educational Centre and Technical Education	5	20
	2.	Intermediate College	28	3.57
	3.	High School	42	2.38
	4.	Junior High School	113	0.88
	5.	Primary School	734	0.13
B. Medical Facilities	6.	General and Specialized Hospital	9	11.11
	7.	Primary Health Centre	11	9.09
	8.	Family Planning and Maternity Child Health Centre	69	1.44
	9.	Dispensary	81	1.23
	10.	Veterinary Hospital	12	8.33
	11.	Stock Man Centre	56	1.78
C. Transport & Communication Facilities	12.	Bus Station	11	9.09
	13.	Bus Stop	122	0.81
	14.	Sub Post Office with Phone	41	2.43
	15.	Branch Post Office	272	0.36
D. Commercial & Marketing Facilities	16.	Banks	25	4.00
	17.	Agricultural Credit Society	133	0.75
	18.	Food Grain Distributing Centre	17	5.88
	19.	Wholesale Shop	66	1.50
	20.	Fair Price Shop	400	0.25
E. Police Facilities	21.	Police Station	4	25
	22.	Police Check Post	21	4.76
	23.	Patwari H. Q.	211	0.47
F. Development Facilities	24.	Village Level Workers' Head Quarters	195	0.51
	25.	Seed and Fertilizer Depot	11	9.09

* Data collected from concerning departments in June 1979.

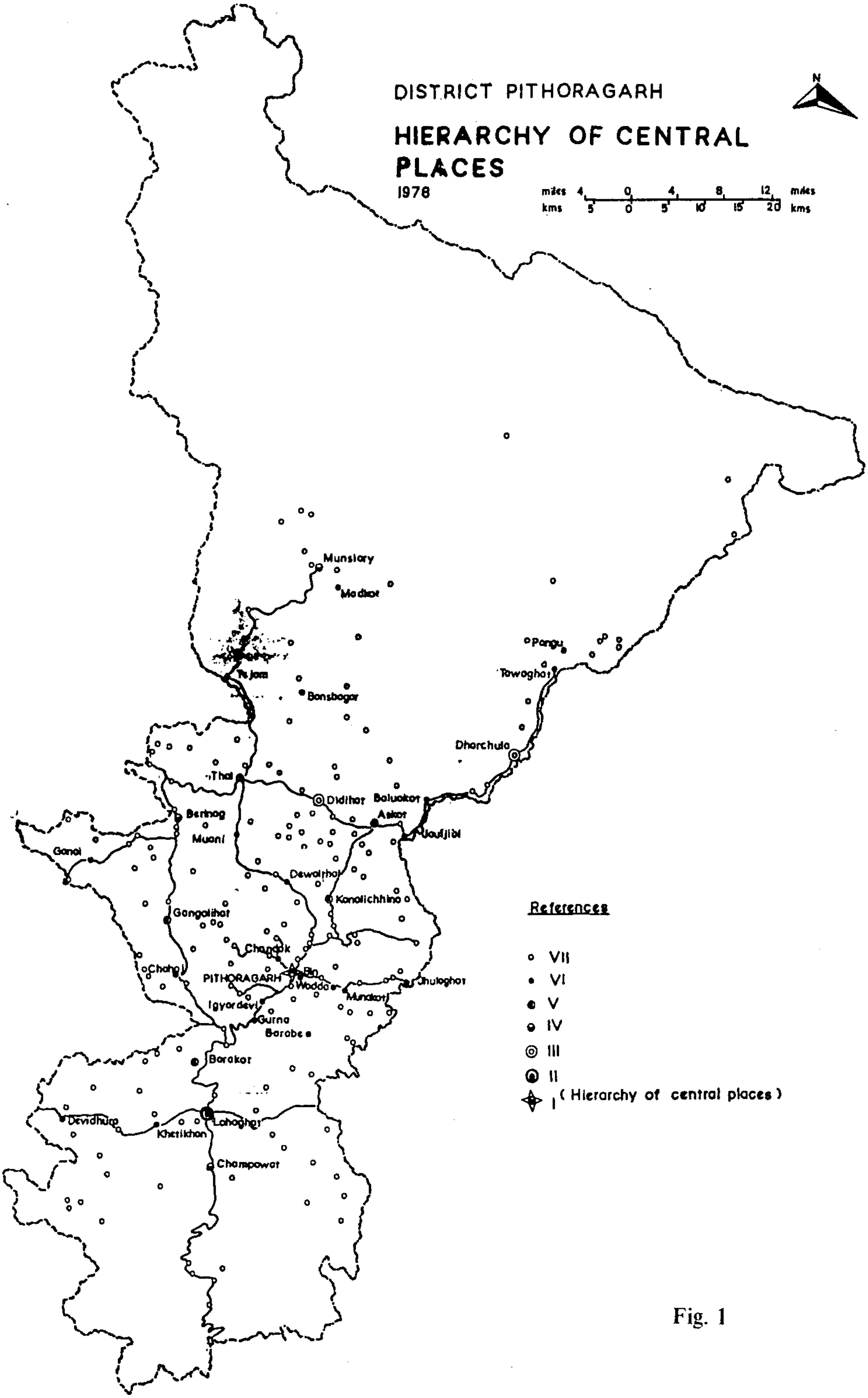
DISTRICT PITHORAGARH
HIERARCHY OF CENTRAL PLACES
1978
N
miles 4 0 4 8 12 miles
kms 5 0 5 10 15 20 kms
Munsiary
Madkot
Tejam
Bansbagar
Pangu
Tawaghat
Dharchula
Thal
Didihat
Baluakot
Askot
Jauljibi
Berinag
Muani
Ganai
Dewalthal
Kanalichhina
Gangolihat
Chandak
Chahaj
PITHORAGARH
Bin
Wadda
Jhulaghat
Munakot
Igyardevi
Gurna
Barabe
Barakot
Devidhura
Khetikhan
Lohaghat
Champawat
References
VII
VI
V
IV
III
II
I (Hierarchy of central places)

Fig. 1

quirement of four functions was adopted to identify the central places. As a consequence, 216 settlements were identified as central places (Fig. 1).

CENTRALITY SCORE AND POPULATION SIZE

The analysis of hierarchical order of central places also involves the problem of number-size ratio which implies the relationship between the number and order of centres and population size. The working hopothesis is that the high centrality corresponds to the higher population size and the number of settlement of given type should continue to increase as size decreases. The correlation analysis shows a poor relationship (r = 0.39 signiificant at only 5 per cent confidence level) indicating that the ranks-size relationship does not hold good in the study region. Besides, the population of recognized central places was plotted on scatter diagram against centrality score (Fig. 2a) which revealed that in many cases the central places had a population less than its lower order centres. The principal reason being the peculiar pnysical landscape and the characteristic cultural growth of the centres. It was discovered that many centres have been developed on road sides as well away from the revenue villages. They did not exist as settlement neither in the census hand books nor in the revenue records of the district.

HIERARCHICAL PATTERN

In the present study the hierarchical grouping of central places is obtained from the array of centrality score by employing the technique of variance analysis. The Z value of centrality score for each central place has been calculated. Thus, the classification of centres in a hierarchic order is worked out with the help of variance of Z value from the mean centrality score of the centres. The technique has revealed a seven tier central place hierarchy composed of 1 first order, 1 second order, 2 third order, 3 fourth order, 5 fifth order, 21 sixth order and 183 seventh order central places (Fig. 2b). The grouping is formed with a class

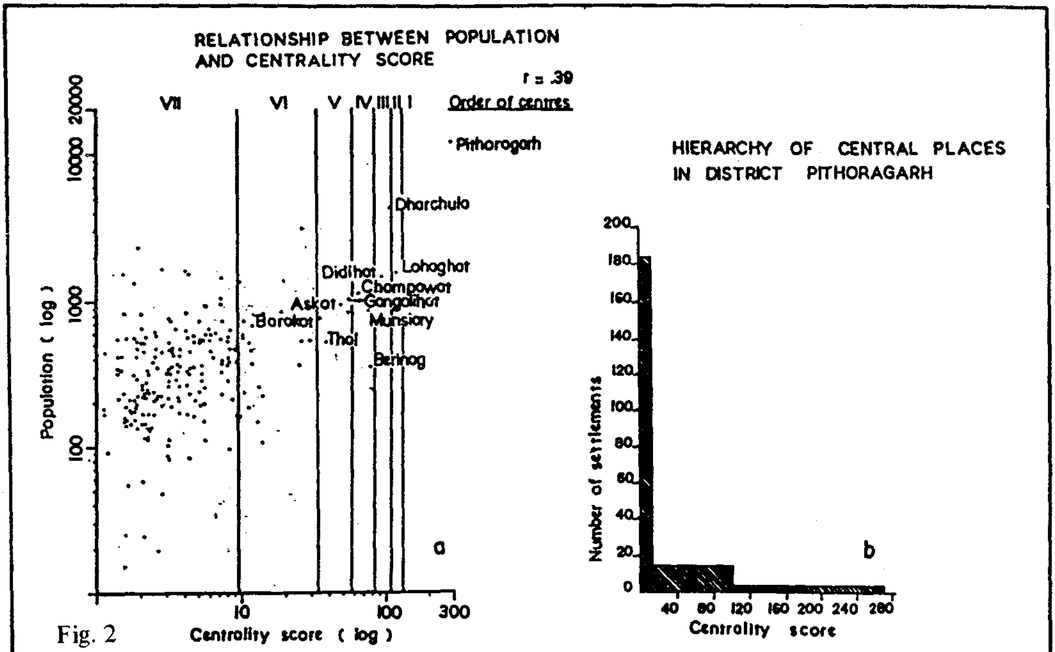

Fig. 2

TABLE 2 : HIERARCHICAL PATTERN OF CENTRAL PLACES

Order	Z Value	Range of Centrality Score	Number of Centres
I	Above +5	Above 130.84	1
II	+4 to +5	106.61 to 130.84	1
III	+3 to +4	82.38 to 106.60	2
IV	+2 to +3	58.15 to 82.37	3
V	+1 to +2	33.92 to 58.14	5
VI	0 to 1	9.69 to 33.91	21
VII	0 to −1	Below 9.69	183

interval of + 1 Z value and it extends from below mean to above + 5 Z value (Table 2).

In order to verify the objectivity of hierarchical ordering, number of functions in a central place are plotted on scatter diagram against the centrality score (Fig. 3).

The scatter plot shows the marked distinction between the grouping of different order of centres. It also shows the increasing functional complexity or functional magnitude in higher order centres.

Having classified the central places into different orders, it seems desirable to examine the characteristics of centres of different groups.

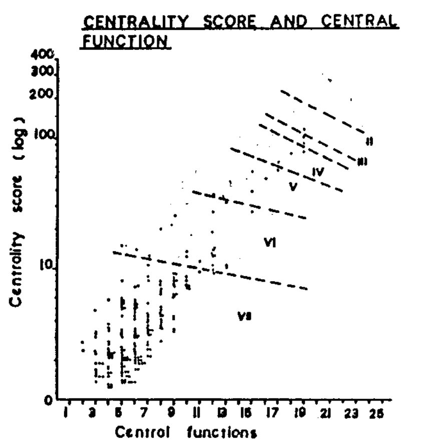

Fig. 3

IST ORDER CENTRES

At the apex of the hierarchical class system stands the district headquarter of Pithoragarh which is the only recognized town of the entire district. It has attained the highest centrality score of 273.52. The variety of functions include higher education and technical education, specialized medical facilities, administrative and police facilities, developmental services, banks, transport and communication and commercial facilities. The centre is predominantly a commercial one since the functional type of wholesale and fair price shops have the highest outlets being 44 and 17 respectively. Education has a long and glorious historical and cultural past which was recognized as a town much early in 1933 by British government. After independence it became a tehsil headquarter of Almora district and raised to the status of a district headquarter in 1960. Since then rapid growth has been noted in every sphere and the census of India recognised the centre as a monofunctional town in 1971 when the population was only 11,924.

IIND ORDER CENTRES

Lohaghat is the only centre of this order showing a centrality score of 118.35 with 19 central functions. It is a block headquarter and more similar to its successive lower order centres in respect of functional magnitude. The development of the centre has been prompted more by its location in Pithoragarh-Tanakpur motor road showing commerce as an important function.

IIIRD ORDER CENTRES

Of the two III order centres, Dharchula possesses greater functional complexity then Didihat regarding the commercial activities. However, both centres have same number of functions i.e. 19 central functions and also have a similar provision of educational facilities, banks, police and medical facilities. The centrality varies from 92.36 in Dihihat to 106.46 in Dharchula. These centres have emerged as trading centres because of predominant commercial functions.

IVTH ORDER CENTRES

Within the fourth order centres, block headquarters of Berinag has a high centrality score of 79.97 in comparison with the centrality score of 65.19 of Champawat and 78.19 of Munsiary. All these centres dispense developmental services such as, bank services, credit facilities etc. with an average number of 18 central functions. Functions like bus station and police station have differenciated these centres from preceding high order centres.

VTH ORDER CENTRES

There are five centres viz. Kanalichhina, Gangolithat, Askot, Thal, and Barakot falling in this class. The average number of 15 functions are found in these centres and the centrality varies from the lowest 34.07 in Barakot to the highest 57.05 in Kanalichhina. These centres distribute the services of lower order medical facilities such as, veterinary hospital, stock man centre, dispensary and maternity – child health centre in common and functions like technical education, police check post in particular.

VITH ORDER CENTRES

This class includes 21 centres exhibiting from the lowest centrality. Score of 9.93 in Barabe to the highest 32.02 in Munakot. The variety of functions include education upto higher secondary level, sub-branch postal services, dispanseries, seed and fertilizer depo, village level workers centre, stockman centre and smaller commercial services. The number of functions performed by these centres varies from the lowest 5 in Tawaghat to the highest 13 in Baluakot.

VIITH ORDER CENTRES

The seventh order hierarchy consists of a large number of 183 central places accounting for 84.7 per cent of the total central places of the district. This class is further divided into two sub divisions in view of its greater range of centrality. Fifty-three centres are lying above – 0.20 Z value and showing a centrality range from 5 to 9.69 form a distinct group marked by rural market characteristics. The remaining 130 centres are merely central villages having a narrow service zone extending upto five to eight villages. The former group also performs intermediate level education and lower medical facilities.

SPATIAL ORGANISATION

The spatial pattern of central places in the study region does not confirm to hexagonal lattice arrangement due to the diversified topography and varying settlement due to the diversified topography and varying settlement and population densities. The study has revealed that the locational aspect of rural central places has been a matter of prime concern to distinguish and discern the spatial pattern of the centres. Three types of locations were observed which have given rise to a typical Himalayan pattern. The three types are valley bottoms ridge tops and mid slopes consisting 40 per cent, 22 per cent and 38 per cent of the total central places of the district. Most of the higher order centres upto fifth category are found located either on valleys or on ridge tops. Meanwhile sixth and seventh order centres are mostly developed on mid slopes. The locational characteristics of the central places ultimately tend to create a linear pattern forming an oval shaped serving zone. The linear pattern develops either along a river valley and along a transport routes or on ridge tops.

So far as the distributional pattern is concerned, higher order centres ranging upto third order are mostly confined to the blocks like Pithoragarh, Lohaghat, Dharchula and Dihihat. The relative position of blocks changes when considered in terms of percentage share of centres to total settlement of each block. Block Dharchula has the highest 35.7 per cent central places of its total villages, Barakot ranks (5.5%) at the other end.

Next to Dharchula is Pithoragarh (17.6%) followed by Munakot (14.8%), Didihat (12.8%), Kanalichina (11.8%) and Munsiary (8.7%). The percentage share of other blocks namely Lohaghat, Gangolihat, Berinag and Champawat is 7.9 per cent, 6.7 per cent, 6.3 per cent and 5.9 per cent of their total villages respectively.

An attempt has also been made to assess statistically the influence of certain selected factors such as, relative relief, absolute relief and average slope from physical group and density of agricultural land, settlement and population as well as transport routes from cultural groups. The correlation of each factor is worked out with the density of central places which ranges from one central place per eight square mile to one centre per two square mile in the region. The correlation co-efficient of central place density with relative relief ($r = -0.89$), absolute relief ($r = -0.78$) and average slope ($r = -0.35$) is found significant at 0.05 confidence level. Besides, the cultural factors show high positive correlation being + .81, + .75 and + .79 in case of agricultural density, population density and the density of settlement significant at .01 level. The central place density also records a stronger relationship with transport routes ($r = + .69$) significant at .005 level.

CONCLUSION

On the basis of the above analysis, it may be concluded that the Lesser Himalayan part of the district has encouraged the optimum growth of central places because this zone is endowed with favourable physical conditions and thereby enriched with cultural advancement. Low elevation, lower relative relief and gentle slope account for the high density of agricultural land, settlement and population as well as a developed transport network which collectively have guided the growth of the centres in this region. On the contrary, Greater and Siwalik Himalaya present most unfavourable conditions for agriculture and settlement which prevents the growth of central places.

Besides the above general inferences, it is equally important that Tehsil Dharchula of Greater Himalayan zone has recorded highest number of centres belonging to sixth and seventh order central places. Here the settlements are widely distributed and mostly concentrated on some suitable sites. This necessitated the growth of a central place within each cluster. It is therefore clear that the distribution of central places in the study region may not be defined under any geometrical rule. The aggregation of services is found at most convenient central locations which can serve maximum tributary population. Similarly, central places are mostly developed along motorable roads and influenced by factors like surface slope, accessibility and consumers travel distance etc. The spatial patter of central places is therefore defined under three basic patterns – ridge tops, valley bottoms and mid slopes that explain the peculiarities of three dimensional surface condition of hill areas.

FIGURE EXPLANATION

Fig. 1 : Hierarchy of Central Places .

Fig. 2a : Relationship between Population and Centrality Score

Fig. 2b : Hierarchy of Central Places (Graph)

Fig. 3 : Centrality Score and Central Functions.

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