NATURAL ENVIRONMENT AND SOCIO-ECONOMIC CHARACTERISTICS OF HIGH ALTITUDE SETTLEMENTS : A CASE STUDY OF KARGIL TEHSIL (LADAKH)

Dissertation submitted to Jawaharlal Nehru University
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MASTER OF PHILOSOPHY

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1988

DEDICATED

TO MY PARENTS

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26th August, 1988

CERTIFICATE

Certified that the dissertation entitled "NATURAL ENVIRONMENT AND SOCIO ECONOMIC CHARACTERISTICS OF HIGH ALTITUDE SETTLEMENTS : A CASE STUDY OF KARGIL TEHSIL (LADAKH) " submitted by Shujat Ahmad Banday in partial fulfilment of the requirements for the Degree of Master of Philosophy is a bonafide work to the best of our knowledge and may be placed before the examiners for their consideration.

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19.8.88
Dr. Harjit Singh
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SHUJAT AHMAD BANDAY

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CHAPTER - I

INTRODUCTION

"The study of man environment relationship is the essence in Geography. The level of this interaction in a region indicates its stage of development. Man, unlike other animals does not only adapt himself to nature but interacts with it, modifies and transforms it and gets transformed in this process."[1] Nature play determining role in early stages of development and man is usually at the receiving end and tries to adapt and accommodate himself within limits laid down by nature. In this process of man-environment interaction particularly in backward mountainous areas man is mainly at the receiving end due to low level of available technology. Nevertheless in process of adaptation man modifies nature though to a limited extent by adjusting himself to the dictates of the latter. Man in such areas inhabited by backward primitive societies either becomes a pastoral nomad or a cultivator by carrying out rudimentary farming whereever cultivation is possible.[2]

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1. H.Singh, Ladakh - Problems of Regional Development in the context of growth point strategy, unpublished Ph.D thesis, J.N.U., 1978, p.3.

2. Ibid., p.5.

It has been seen that people living in high altitude area either take to pastoral economy by becoming nomads or settled down in relatively fertile low lying valleys. Man in such societies has developed technology which may seem to be primitive but is quite effective in such an environment. Most of the cultivated area usually consists of river terraces and alluvial fans, where land has been levelled and terraced. The natural deficiency of water, if the region is arid , is being met with help of irrigation. As the geological structure and ruggedness does not permit wells to be dug in mountain lands, water is diverted from streams and springs by constructing narrow irrigational channels popularly called Kuls. The low temperatures generally experienced in mountain lands has been partly overcome by introducing early maturing varities of crops.[3] Thus these facts of the mountain Geography reveal that the study of man-environment relationship is very significant in such regions.

Ladakh with its inaccessible mountains, isolated valleys, desert landscape and extremely inhospitable climate is a typical of such areas where nature rules all expressions of human life. Man in his entire living

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3. H.Singh,"Environmental Constraints on Agriculture in a Cold Desert: A Case Study of Ladakh." In Perspectives in Agricultural Geography, Noor Mohammad, edt., Vol. 2, Concept Publishing Company, New Delhi,1981, pp.25-39.

habits is influenced by the surrounding natural conditions. All human occupance units in this cold desert are situated within the river valleys and settlements follow the course of the rivers. The long lasting winter which the region experiences , has resulted in construction of houses with small doors and windows, probably to save scarce wood on one hand and to keep off the cold winds on the other. During winter months, the climatic conditions are very severe. The strong environmental constraints are reflected in the low carrying capacity of land and the limited manpower of the region. It is perhaps due to "Environmental Encapsulation" [4] that the region had till 80's experienced a low growth of population.

These aspects of the Geography of Ladakh can be understood best by studying the settlement structure and its spatial organisation that have evolved in consonance to physical and socio-economic factors.

This study is an attempt to analyse the influence of Natural Environment on the socio-economic characteristics of settlements and on their spatial distribution,

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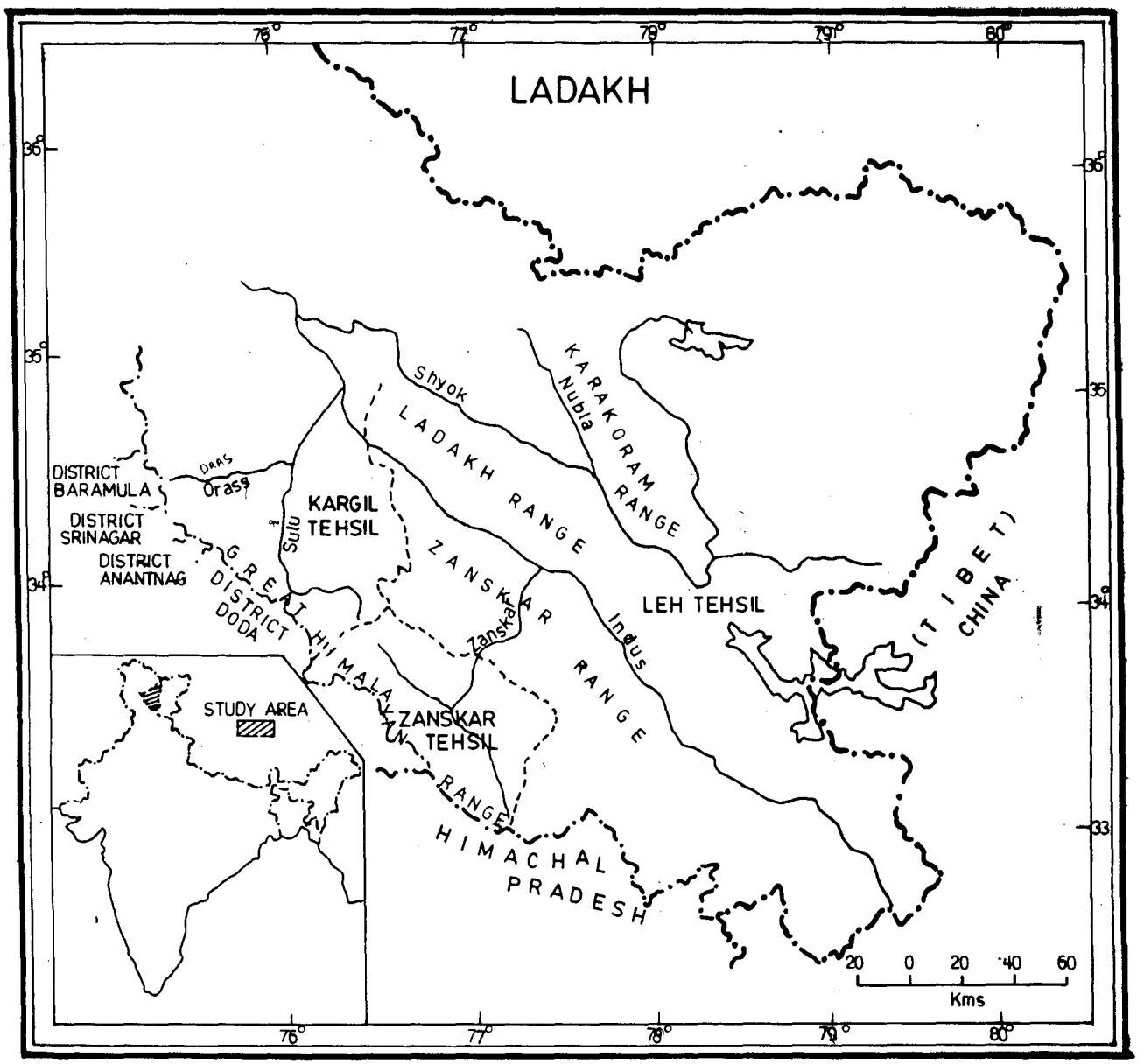
4. M.C. Goldstein "High Altitude Tibetan Population in the Remote Himalaya: Social transformation and its Demographic, Economic and ecological consequences ", Mountain Research and Development, Vol. 1, No.1, 1981.


LADAKH
DISTRICT BARAMULA
DISTRICT SRINAGAR
DISTRICT ANANTNAG
DISTRICT DODA
KARGIL TEHSIL
LEH TEHSIL
ZANSKAR TEHSIL
LADAKH RANGE
KARAKORAM RANGE
ZANSKAR RANGE
GREAT HIMALAYAN RANGE
HIMACHAL PRADESH
(TIBET) CHINA
Shyok
Nubla
Suru
Drass
Zanskar
Indus
STUDY AREA
20 0 20 40 60
Kms
75°
77°
78°
79°
80°
36°
35°
34°
33°

Map - I.1

in Kargil region. The study has been conducted with special reference to five high altitude villages of Kargil tehsil selected on the basis of historical, cultural and physical factors. Various studies in India and abroad have revealed that an nature relationship in mountainous areas can best be understood by taking both physical and cultural aspects into consideration. This study has been attempted on the same lines.

Kargil tehsil as shown in Map 1.1 is situated between $74^{o}34'$ E and 77^{o} 78' E longitude to 33^{o} 50' N and 34^{o}-70' N latitude, with a geographical area of approximately 8282 sq.kms of which 148.2 km^{2} form the assessed village area. The tehsil supports a population of 57675 persons (1981). It largely coincides with the river basins of the Dras, the Wakha and the Suru and parts of the Shingo and the Indus rivers. These rivers basins contain all 104 rural settlements of Kargil and the town(Kargil). All major villages are situated at an altitude of below 4000 metres. Part of area lying between 4000 metres to 4500 metres is under pastures used during summer months for grazing. And the area above 4500 metres is highly rugged and is unfit for human and vegetative life.

This study pertaining to the settlement structure and their spatial organisation obviously is primarily concerned with these river valleys and the socio-economic activities carried by the man therein. It is in river valleys where man-environment interaction occurs.

Previous Works on Ladakh:

Most of the literature available on Ladakh is either in the form of travelogues and general accounts or deals with political, historical, social, economic and religious themes. Accounts on Kargil in most of the studies appear as a part of the write up on Ladakh. Only a few studies on Ladakh are based on Field Work and Emperical data. Literature available can be divided into three categories:

a. Earlier Records

b. Writings of the 18th, 19th and of 20th century upto 1974.

c. Recent publications written after 1974.

Earlier Records:

The earliest notices of Ladakh are found in works of ancient Greeks. Pliney in his cesiwrites about the land lying along the Indus and its tributries and surrounded by deserts and mountains. Ptolemys A-Khassa regio agrees equally well with the location of Ladakh, described to be east ward of

Byltae.[5]

Authorities on Tibetan history have practically agreed that what Herodotus says about the country of "Gold digging ants"[6] refers to the Land of Dards on Indus.[7]

In 399-400 A.D. Chinese piligrim Fa-Hain proceeding towards Kie-cha crossed the mountains of Tsung-Ling. On these mountains it is said snow never melted and native of the country were known by the name of men of snowy mountains". Fahain wrote that Kie-cha "identified as Ladakh,"[8] was mountainous and so cold that no grain except corn ever ripened.

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5. A.H. Franke , Ladakh the mysterious land, (Cosmo Publication, New Delhi, 1978), p.16.

6. These gold digging ants can be identified with Marmots who burrow into the ground for shelter throwing up earth in the process as explained by A.H. Franke , Ladakh the mysterious land, Cosmo. New Delhi, 1978, p. 12

7. Ibid.

8. Alexander Cunningham, Ladak, Physical statistical and historical. Sagar publication, New Delhi, 1970 reprint, p.

Hiuen -Tsang around 640 A.D. wrote about land of San-pho-Lo, Tibetan name of Indus, and "kingdom of Mo-Lo-Pho "[9] which probably refers to eastern part of Ladakh.

Another Chinese piligrim Ou-Khong reached Kashmir in 759 A.D. and wrote about communication system between the valley and surrounding world. He describes the road to Tho-Fan or Tibet which corresponds to the Zoji-La route connecting Kashmir with Ladakh.[10]

Literature available about Ladakh around 500-1000 AD is based on Tibetan historical records. During this period , the Devanagariscript of India was introduced into Tibet from Kashmir by learned Lama Thumi-Sambhota and monasteries began to keep written records. Unfortunately , all the information available has not been translated so far. In fact from that time down to the end of 16th century, very few historical records exist in Ladakh.[11]

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9. A.H. Frank, op.cit., p.40-41.

10. A.H. Franke, op.cit., p.45.

11. A. Cunnigham, op.cit., p.317.

The travelogue of sixteenth century written by Mirza Haider Dughlat,[12] throws sufficient light on political events, trade routes and socio-Economic structure of Ladakh of that time. The travelogue though very useful for study of political events and border skirmishes between local chieftans, also describes major routes and their role in trade and commerce. Several description about dresses, food habits and agricultural conditions are very useful to understand socio-economic conditions of Ladakh of 16th century.

Information about Ladakh during the 17th century is found in the translated works of Zanskari Saint Khrul-Zig Nag-Daban-Tshe-Rin born in 1717.[13] From this work we learn about the dreadful epedemic of 1717 , and the stories about construction of Mane-Walls made up of rocks and boulders by way side and at cross roads; and information about the stopage of inflow of taxes which resulted in Ladakh being reduced to a border area, suffering from chronic poverty.[14]

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12. M.H. Dughlat, Tarikh-e-Rashidi, A history of Mughals of Central Asia, edt. with commentry and notes by N.Elias, Low Marston, London, 1895.

13. Nawang Tsering, Buddhism in Ladakh, Sterling Publishers, New Delhi, 1977, p.28.

14. Ibid., p.34.

Writings of 18th, 19th and 20th century:

Literature on Ladakh written during this period is in the form of travelogues, written by Missionaries, Administrative or Army personnels who visited the area. Desideri(1715) is the first European scholar to have given a concise and useful geographical information of Ladakh.

Moorcraft (1820-1822), travelled extensively in Ladakh and his description appeared in Travels in Hindustan in two volumes published by Treback after Moorcraft's death. In the first volume given are the useful description about the physiography, rivers, cultivation practices, soil and climate of various parts of Ladakh. Speaking about the Ladakh Moorcraft says "The country of Ladakh lies at a lower elevation then mountain ranges, which serve as ramparts to its northern and southern frontiers, yet its general character is that of its gigantic neighbours and its lowest level are in the vicinity of perpetual snow."[15] About the rivers of Dras valley, we learn that "except were arrested by the hand of winter, they hurry along with rapidity and force, and are frequently unfordable, rather from the impetunity of

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15. William Moorcraft and George Treback, Travels in Hindustan(1819-1825), Sagar publication, New Delhi, 1971, reprint. Originally published in 1837 in London, Vol. 1., p.259.

their currents than their depths."[16] In Volume - 2, description about climate, population and character of the inhabitants of Dras valley and details about Prangas,[17] plant of Dras area are very useful. Moorcraft describes population characteristics, food habits, housing condition and agricultural practices of Pandras and Matayan villages in Volume -2. We learn herethat people of Pandras and Matayan were wretchedly poor and settlements were made from stones and pebbles cemented with earth with terraced roofs.

Alexander Cunninghan (1853) is perhaps the first scholar to give a detailed account of historical, cultural, social and economic conditions prevalent during his time in his monumental work Ladak. Information about trade links of Ladakh with Tibet and surrounding countries have been dealt with detail. The statistical information about physical and climatic conditions presented high-light the harsh Environmental conditions and their influence on socio-economic aspects of settlements.

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16. Ibid., p.264.

17. Prangas is a Fodder Plant Found in Dras valley on its hill slopes.

Another important work of authority on Ladakh is of Fedrick Drew(1857)[18]. Drew came to Ladakh in 1857 for the first time from Geological Survey of India. In 1862, he joined the services of Maharaja of Kashmir and in 1872 retired as the Governor of Ladakh. He visited Dras, Kargil areas of present Kargil district [19] in 1861, 1862, 1871 and 1872. From Drews work we learn about the ethnography of inhabitants of these villages. He has described about the Food habits, dresses and position of females in Ladakhi Society. Details about different routes and approximate height of different geographical features also are presented. Drew was the first scholar to have described the geology and geomorphology of different units of Ladakh.

Among other important accounts on historical and religious aspects of Ladakh, written by travellers and missionaries, descriptions by Vigne(1842) and K.Marx(1891)

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18. F. Drew, Territories of Jammu & Kashmir, Oriental Publishers, Delhi, 1971, reprint.

19. In 1979, Ladakh was divided into two districts Leh and Kargil following the administrative reorganisation of districts. Before 1979, Ladakh was administratively a single district.

are important in knowing the political events and genological details about ruling dynasty. Marx in his article "Kings of Ladakh" translated by Franke writes about the geonological attributes of Ladakhi Kings. Aitchinson(1874), Biscoe(1892) and Deasy(1902) contributed further towards historical geography of Ladakh. These accounts are useful for understanding the unique Man-Environmental patnership that has evolved in Ladakh.

Next work of authority to appear was by A.H. Franke (1907-1925)[20] in two volumes . These two volumes are perhaps one of the best works on historical evolution of Ladakh. In first volume detailed information about monasteries, religious and social customs, political happenings and geographical facts have been presented. Description about settlements in the Indus and Sutlej valleys , around and in Leh city, Kargil town and Dras and Srinagar areas are very useful in analysing the environment and its influence on human settlements. The second volume is attributed to historical evolution of Ladakh . Detailed information about history of Ladakh, based on translated chronicals, are described in this volume.

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20. A.H. Franke, Antiuquites of Indian Tibet, Vol. I and II, New Delhi, reprint, 1972.

Tariq-e-Jammu written in Urdu by Hashmet-Ulla-h-Khan (1939), is a comprehensive account about location of administrative region of Ladakh, historical evolution of settlements and agricultural production and population census.

Other notable works before the border dispute of 1962, between India and China, for historical evolution and socio-cultural aspects are of L.Petch(1939), J.N. Gauhar (1956) and J.A. Stain(1962).

Other significant contributions in understanding of the social, religious and historical facets of the mysterious land of Ladakh of academic interest are the works of Lama A. Govinda (1969), T.S. Murty(1970), M.C. Goldstein (1971) and Trungpa (1973).

Recent Works of Post 1974:

In 1974, Ladakh was declared open to foreign visitors and number of books and articles have appeared since then on Ladakh. However most of the literature available has been written from a tourists point of view. So in our analysis such material has been excluded.

One of the academically oriented research collection of articles about various parts of Himalayas appeared in

the Himalaya(1976); and it containstwo articles regarding the socio-economic and religious aspects of Ladakh. The article by Stein & Jest(1977)[21] is a comparative study of development and architecture of Ladakh and Bhutan. H.Singh(1977) article titled "Territorial Organization of Gompas" highlight the role of religious institutions, in small communities sustaining themselves at a low level of technology. The cultural heritage of Ladakh(1978)[22] contain several useful articles on geographical and socio-cultural aspects of Ladakh.

Hussnain (1975) has attempted a detailed analysis of the history, people, culture and religion of Ladakh. The book though highly informative deals with places around Leh. Gergan(1977) and Hussnain (1977) have produced H.Frankes old work with a highly informative introduction, and profuse annontation.[23]

Dr. H.Singh (1977 , 1979,1983) has published several informative articles on space relations of Ladakh, on agricultural problem, on educational problems of Nubra valley and about general socio-economic set up of various parts of Ladakh.

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21. J.A. Stein and C.Jest, "Dynamics of development and tradition: The Architecture of Ladakh and Bhutan", Himalaya : Ecologie-Ethnologie, C.N.R.S, Paris, 1977, pp. 343-50.

22. EducationMinistry,"The Cultural Heritage of Ladakh, Delhi, 1978.

23. A.H. Franke, A history of Ladakh with critical introduction and annotation by S.S. Gergan and F.M. Hussnain, Sterling, New Delhi,1977.

General description about the history , socio-economic structure cultural fabric and religion of Ladakh are present in works of C.Jest(1975), Rabgyas(1978) and N.R. Jora(1977). S. Koshal(1979) has attempted a grammatical study of Ladakhi language. B.N. Aziz (1978) has done research on social and genelogical strucutre. The works of H. Harner(1978) , H.P.S. Ahulvwalli(1980) are useful for understanding of social structure and stratification of Ladakhi society.

J.Razivi(1983) in her book has incorporated useful information about physiography of Ladakh, a detailed description of the Gompas around the Leh city and the fast changing character of Leh city because of tourist in flow.[24] The description of the religious function of Buddhist and Muslims inhabitating Ladakh are useful. The book is a comprehensive study of different socio-cultural facets of the mountain desert of Ladakh based upon authors personal observations during her stay in Ladakh from 1976-78. However, the book deals mainly with Leh and places around it and hence is of little use for Kargil area.

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24. J.Razivi, Ladakh crossroads of high Asia, Oxford University Press, Delhi, 1983.

Siddiq Wahid(1981)[25] in his book has incorporated several useful photographs by Kenneth R.Storm.i This book is a useful attempt to explain the past and present of Ladakh by studying the professions of.farmers , metal workers, weavers and carpenters of Leh and Zanskar.

Recently geo-scientists have started unvailing the hidden geological information in Ladakh. A number of studies have appeared about stratigraphy, economic geology and palaeontology for the ranges of Ladakh and Zanskar. Gupta (1971,1974,1975), Pande(1971) and Saxena(1972) have contributed towards the historical geology of ranges in Ladakh. Recently a series of articles about stratigraphy and geological structure of different geological units of Ladakh have appeared in the contribution to Himalayan Geology.[26] The volume contains several informative articles on various geological themes.

One of the latest translated books to appear on Ladakh originally published in Germany by S.H. Ribbach(1940), is by John Bray(1986). This book is a case study of Drogpa

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25. Siddiq Wahid, Ladakh Between Earth & Sky, B.I. Publication, New Delhi, 1980.

26. V.J. Gupta, Contributions to Himalayan Geology(edt.), Hindustan Publishing Corporation, Delhi, Vol.2, 1983.

Namgyal a farmer from Khalsi village of district Leh.[27] Information about social customs, child birth ceremony, Buddhist way of living have been presented as a biography of Dropa Namgyal, with useful annotation.

A very useful information about recent research on history, culture, sociology and ecology of Ladakh is available in the book Recent Research in Ladakh[28] in the form of papers following the proceedings of a conference held at the University Konstanz on Nov 23-26, 1981. One of the articles titled "Six Families of Leh" by J.H. Crook and T.Shakya is a comparative anthropological study of the six families out of eleven households which prince Peter(1938) had selected for his anthropological research. In this paper , research about marriage, sex distribution, kinship and domestic arrangement etc of these families have been compared at two points of time 1938 and 1981.

Peter eppler's (1981) article is based upon statistical data on tourist arrival in Ladakh and its impact on Leh and its surroundings. Ria Reis(1981)

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27. S.H. Ribbach, Culture and Society in Ladakh, translated by John Bray, ESS ESS Publication, New Delhi, 1986.

28. Detlef Kantowsky and Reinhard Sander (edt.) , Recent Research on Ladakh -History, Culture, Sociology, Ecology., Weltforum Verlag, London, 1983.

has studied the position of Buddhist woman in and around Thikse village by studying the social, economic and biological aspects of woman. The book contains several articles in French and German language, which unfortunately have not been translated.

Besides these works, a number of useful articles have appeared on Ladakh by Sandhya(1983, 1986) on socio-economic condition and development in Zanskar (Ladakh). Another important article on the long list of articles on Ladakh is by M.Raza and H.Singh(1983) which appeared in Development of Hill areas.

Thus, the literature review on Ladakh in general and Kargil in particular reveals that very few studies have been done on socio-economic characterstics of high altitudes villages of Ladakh. This study of the settlement and their natural environment and their socio-economic characteristics has been attempted to analyse the processes governing the settlement structure of Kargil. The dynamic interaction between natural and man made environment has been studied with the help of empirical evidences. It is expected that this study will help in formulating rationale strategy for socio-economic development of settlements in backward areas like Kargil.

Objectives of Study and Research Design

The study of human settlements must be understood as a compromise of all the possible physical and cultural factors of the environment of the concerned area. Owing to this relationship, settlements have been studied in relation to the environment. The objectives of the study are -

i. To study the natural environment , resources and geological processes operating in the region which provide the basic landscape for settlements.

ii. To study the evolution of settlements from historical prespective and to analyse the demographic and economic base of settlements of Kargil.

iii. To analyse the spatial organization of settlements and their structure that have evolved in consonance with the physical and socio-economic factors in Kargil.

iv. And finally hierarchy of settlementsn in terms of amenities and socio-economic characteristics have been analysed.

Data Base:

Data for the study was obtained from primary as well as secondary sources. Information about the house types, building material, site and situation of facets of settlement, settlement morphology and food habits were collected through primary surveys and empirical evidences from the following five selected villages:

a. Bodhkhrubu
b. Garkon
c. Pandras
d. Pushkum
e. Rangdom

The additional data for population statistics, socio-economic facilities and land use at village and tehsil level and climatic data were obtained from secondary sources. The following are the main sources of secondary data:

a. District Census Handbook, Ladakh District, 1961-71 1971.
b. District Census Handbook, Kargil District 1981.
c. Statistical Handbook of Kargil, 1980-81, 1983-84.
d. Climatological tables of observatories in India, 1931-60.
e. Block developmental officer Kargil District.

Besides these sources, census maps and toposheet No N1 43-7.were used for geomorphological analysis.

Methodology

Various statistical and cartographic methods and techniques have been used in the course of the study. Important among these are;

i. Morphometric techniques such as ruggedity index , slope analysis , drainage morphometric techniques have been used to understand the physical environment.

ii. Chorochromatic and bar graph methods have been used to show the spatial variation of demographic and economic aspects of settlement.

iii. The settlement pattern has been studied by the near neighbour analysis. The discussion on site and situation of settlements and layout plan of houses have been highlighted with help of photographs and empirical evidences.

iv. The distribution of socio-economic facilities have been presented in form of tables and shown on maps by chorochromatic techniques. Hierarchy of the settlements was worked out with the help of relevant indicators. The ranking of the settlements was done on the basis of composite index and settlement hierarchy was shown with the help of maps.

Organisation of Materials

This study pertaining to the socio-economic and demographic aspects of settlements in consonance with the natural environment of high altitude villages has been arranged by analysing the physical, demographic and economic base of settlements. The study has been presented in the form of six chapters.

The introductory chapter provides theoritical base. Relation between environment and settlements have been highlighted. A review of literature on the region has also been presented. Finally, data base and research methodology were discussed.

In mountainous areas environment shows a pronounced impact on settlements and their socio-economic characteristics. In 2nd chapter, a detailed analysis of physical environment and the natural resource base of the region have been presented. The physical environment has been studied with the help of morphometric attributes, slope charactersitcs and geological processes operating in the region. The climate and physiography have been discussed because these have an impact on housing structure and their lay out plan and on economic activities especially on agriculture.

How have settlements evolved historically? This has been answered alongwith discussions on demographic and economic base of settlements in Chapter-III. The study of genesis of settlements has been supplemented with analysis of distribution and growth of population, sex ratio, literacy rate and the economic characteristics of population. It helps in understanding the demographic and economic basis of settlements which is a function of natural and man made environment.

The fourth chapter deals with spatial organization of settlements that have evolved in response to physical and man made environment. This has been done by studying the site and situation, distributional pattern, settlement morphology and house types of the Kargil.

In the fifth chapter, hierarchy of settlements was worked out and analysed. It has been done by taking into account the distribution of amenities and other socio economic indicators.

Finally conclusions of work have been presented.

CHAPTER - II

NATURAL ENVIRONMENT AND RESOURCE BASE

"Natural Environment - The stage on which man plays out his drama"[1] has an enormous effect on the socio-economic characteristics of settlements in the high altitude and under developed regions like Kargil where the existing use of natural resources are limited due to the low level of technology. Considering the"mountainous terrain of the area it is logical to assume that the natural forces are more powerful in the mountainous lands as compared to the plains in determining the spatial and economic aspects of settlements",[2] their morphology, genesis and pattern.

Natural Environment, influences the nature and type of resources available ; indicates the direction that human activities should follow to utilize these, taking into view the positive aspects of the environment[3]. The natural

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1. J.W. Alexandar, Economic Geography, Prentice Hall, New Delhi, 1977, p.11.

2. V.K. Asthana, "Study of rural settlements around Almora and Environs", Geographical Dimensions of Rural settlements edited by R.L. Singh et al, N.G.S.I., Varanasi, 1976, p.133.

3. S. Gokhale, Man-Environment Interaction and problems of Socio-Economic Development in Zanskar (Ladakh), unpublished Ph.D thesis, J.N.U., 1986, p.46.

environment of mountain regions is "ecologically among the most fragile of terrestrial systems".[4] The study of this system involves the investigation not only of the factors creating the natural environment but also the type of resources available for human use.

The analysis of the natural environment, therefore, becomes imperative in understanding the checks and limits imposed on spatial aspects of settlements and other related socio-economic characteristics on one hand and the advantages offered to the growth and development of settlements through the available resources on the other. The assumptions for the framework of analysis of natural environment and resource base are that "Geological structure and subsequent geomorphic processes from the basic configuration of the topography on which climatic parameters operate. This natural environment provides the basic resources of land, water, vegetation, minerals and energy available for human activities"[5]. In light of above an attempt has been made to analyse the following aspects of the natural environment resource base of Kargil Tehsil:-

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4. Tejvir Singh, et al (ed.) Studies in Himalayan Ecology and Development Stratgies, English Book Store, N. Delhi, 1980, p.194.

5. S. Gokhale op.cit., p.48-49.

i. Geological setting

ii. Physiolgraphy

iii. Land resources and soils

iv. The natural drainage and water resources

v. Climatic conditions

vi. Natural vegetation

vii. Mineral resources

Geological Setting

Stratigraphy:

Kargil region has undergone high tectonic changes and is a zone of compression. The geological formations belong to Indus suture zone and can be divided into the following tectonostratigraphic units:[6]

i. Lamayuru Division

ii. Dras Formation

iii. Shergol Ophiolitic Melange

iv. Zildat Ophiolitic Melanage

v. Nidar Ophiolitic

vi. Indus Formation

vii. Kargil Formation

viii. Ladakh Formation , and

ix. Khardung Formation

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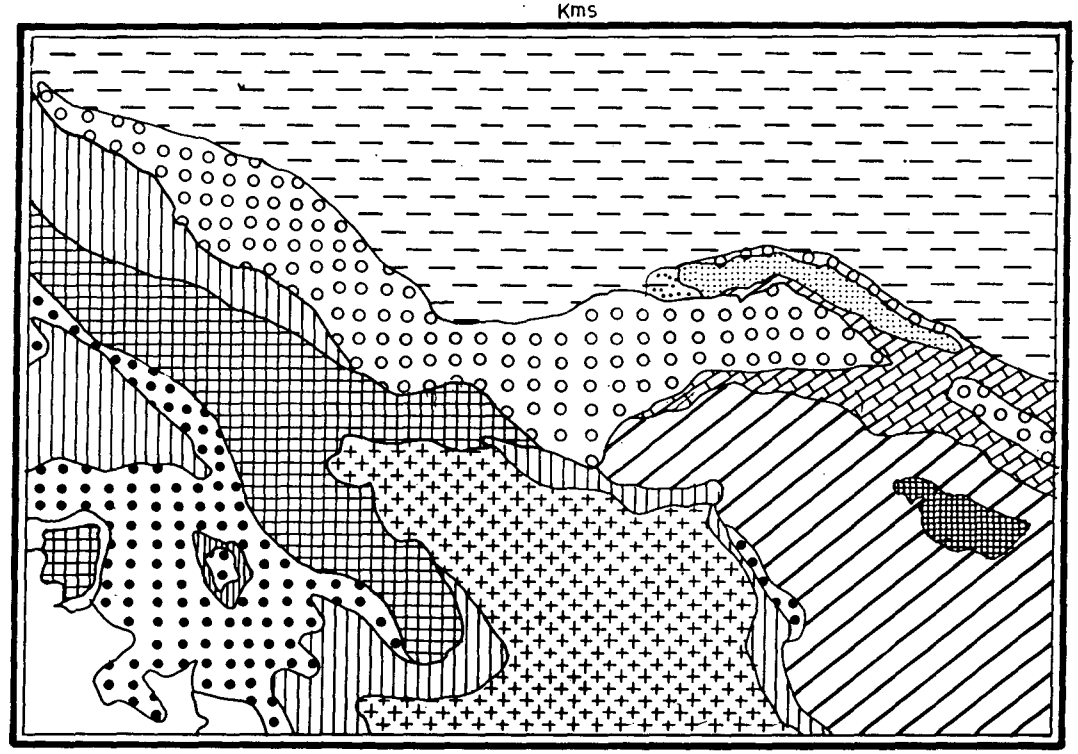
6. V.C. Thakur and V.J. Gupta "Regional Stratigraphy, Palaeontology and Structure of Kashmir and Ladakh Himalayas "in Contributions to Himalayan Geology edited by V.J. Gupta, Hindustan Publishing Corporation, Delhi, Vol.2, 1983, p.1-33.

KARGIL TEHSIL

GEOLOGICAL MAP

40 0 40 80 120

Kms



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INDUS FORMATION

GREAT LIMESTONE

LIMSTONE

DRAS FORMATION

KHARDUNG FORMATION

JERASIC CRYSTOLITHIC COMPLEX

CRYST

SHYOK GRANITE

LADAKH PLUTONIC COMPLEX

KARGIL FORMATION

Map · II·1

Out of these Lamayuru Division, Dras Formation, Shergol Ophiolitic Melange, Kargil Formation and parts of Ladakh plutonic complex fall within the study area i.e. Kargil Tehsil, and hence other formations have not been discussed(map 2.1).

Lamayuru Division:

It includes the Lamayuru and Namikala Flysch.[7] In the western parts it consists of monotonous phyllitic olive coloured shales, silt and fine grained sandstones. At Fotula, Bodhkhrbu and Malbekh the division is represented by large lenticular exotic limestones and these have yielded Fossil Fauna of carbonifers.[8] The rocks of eastern parts of the Lamayuru Division are dark, grey, made up Phyllitic silty calcareous shales and fine grained limestones.[9]

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7. W. Frank, A. Gannser et.al., "Geological observation in the Ladakh area (Himalayas), A Preliminary Report", Schweiz Mineral Petrogr Mitt., Vol. 57, 1977, p. 88-133.

8. N.S. Mathur & D.Pal "On occurance and nature of Exotic Rocks from Lamayuru (Ladakh)" in Contribution to Himalayan Geology, Vol.I, p.1-4.

9. V.C. Thakur et.al., op.cit., p.20.

Dras Formation:

The Dras Formation consists of approximately 4000 meters thick sequence of volcanics at Dras and associated sediments, principally andesite, diabase and volcanoclastics and limestones. Map 2.1 shows Dras Formation to be made up of volcanics at Dras and Kargil and it also includes the associated sediments acquring Flyschodial character at Pashkum and Khalsi".[10] "The rocks have suffered metamorphism at Dras showing mineral assemblage of albite + chlorite + ..." [11]

Shergol Ophiolitic Melange:

Frank et al (1977)[12] are the first scholars to recognise the presence of ophiolitic melanges in the Ladakh area. They point out that these melanges reflect the deep seated disturbances within the suture line. Three belts of ophiolitic melanges recognised by them are exposed at [13];

a. Pushkum - Khalsi
b. Shergol - Mulbekh - Lamayuru, and
c. South of Lamayuru below Zanskar thrust.

The Shergol Ophiolitic Melange are made up of an

---

10. Ibid., p.20.
11. Ibid., p.20.
12. Frank et al; op.cit., p. 80-113.
13. Gupta & Thakur; op.cit., p.20.

association of shale, slate, phyllite, limestone, quartz, arsenite and the dolemites and gabbro.[14] These rocks are considered to be of middle to upper cretaceous period near Malbekh.[15]

Kargil Formation:

Kargil formation are well exposed at Kargil and Baroo (map 2.1). It comprises dominantly of sandstone and shale. "At Basgo and Saspol it is made up of red silty shales and cross bedded sandstones. At Kargil and Baroo the conglomerate overlies unconformably upon the eroded surface of granitides".[16] A study based on fossils of the Wakha area put the Kargil Formation to be of Eocene period.[17]

Indus Formation:

Indus Formation in Kargil Tehsil are separated by a thrust in the north, and to the south it is in contact with the Shergol Ophiolitic Melange(map 2.1). More than 80 per cent of the rocks

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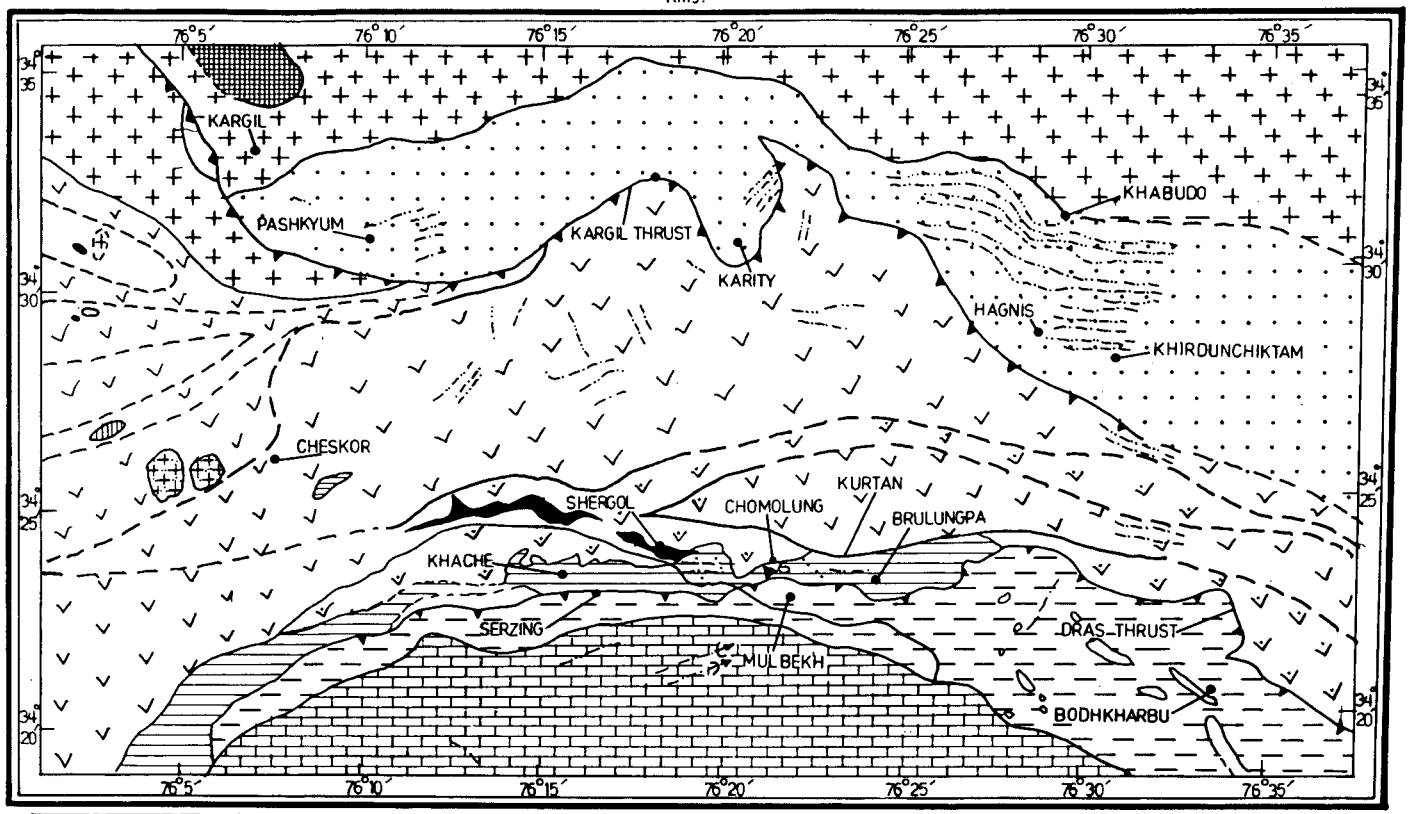
14. Ibid., p.20, The Shergol-Malbek belt has been taken as a type section by Gupta and Thakur and hence all the belts are designated as Shergol Ophiolitic Melange.
15. S.K. Saha and M.L. Sharma, "New Genera From the Exotic Block at Lamayuru, Ladakh." Current Science, Vol. 46(22), 1977, as quoted in Contribution to Himalayan Geology, Vol. 2, 1983, p.20.
16. Ibid., p.22.
17. M.R. Aahni and N.C. Bhatnagar, "Fresh Water Molluscs and Plant Remains from the territories of Kargil" Rec. Geo. Survey of India, Vol. 87, 1958, p.467-76.

KARGIL TECTONIC MAP

2 0 2 4 6 8 10
Kms.



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- FORMATIONAL CONTACT
- FAULT
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- KARGIL FORMATION
- LAVA AGGLOMERATE CHERT SHALE AND SANDSTONE — DRAS FORMATION
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- SLATE SHALE AND CHERT — OPHIOLITIC MELANGE
- LIMESTONE — OPHIOLITIC MELANGE

- MATAYIN LIMESTONE
- ZOJI LA FORMATION
- GABBRO
- TERTIARY GRANITE
- LADAKH GRANITE

Map. II-2

of the Indus Formation fall into the Leh District. This formation consists of a sequence of 4000 meters rocks of alternating conglomerates, sandstones, siltstones and occassional shales.[18]

Ladakh Plutonic Complex:

"These are also known as Ladakh Granites or Ladakh intrusives. These outcrop conspicously in the Ladakh range having Northwest-Southeast trend.along the entire length of the Indus suture zone.[19] The major part of the Ladakh plutonic complex consists of intrusives of ionolite, granodiorite and granite but these also certain mafic complex rocks such as gabbro, gabbric, anthrocite and diomite.[20]

Tectonics and Geological Structure

A glance on the tectonic map (2.2) indicates that the region can be divided into three distinct broadly Eastwest trending units demarcated by two thrusts.[21]

a. The Tethyan zone
b. Indus zone
c. Ladakh zone

---

18. Gupta & Thakur, op.cit., p.22-23.

19. Ibid., p.23.

20. Ibid., p.23.

21. Based on the paper of M.L. Sharma and S.K. Shah, "Structure and Tectonics of the area between Kargil and Bodhkhrubu, western Ladakh, Kashmir, Himalayas in Contribution to Himalayan Geology, Vol. 2, 1983, p. 143-57.

The rocks of Kargil belong to Indus Suture Zone, and this zone is supposed to represent the trace of a subduction line corresponding to the collision surface of Indian and Asian plates.[22]

Tethyan Zone:

Abutting against the Indus suture zone in the south in a synclinorium containing Mesozoic palaeogene sequence. The Northern fringe of this synclinorium is exposed very well between Kargil and Bodkhrbu area. The folding pattern in this zone is complex and most of the sediments have yielded under stress and strain. Map 2.2 shows comparatively open folds in limestones at Matayan but approaching Dras isoclinal folding becomes prevelant.[23]

Indus Zone:

The zone lies between the Dras Thrust to the South and Kargil Thrust to the North. The zone contains Dras Formation and tectonically associated melange belts. The folds in melange are complex. The main fold axis in the zone are West North West - East-South-East to North West South East, which turns

---

22. A. Gansser, "The great Suture between Himalayas and Tibet, A Preliminary Account", Collog. Int. C.N.R.S. Ecologic et Geologic de l'Himalaya, 1977 p. 181-92.

23. Sharma and Shah , op.cit., p.144-45.

sharply to the North South in the Suru Section".[24]

Ladakh Zone:

It consists of Ladakh Granite overlain by Kargil Formation. "Fold axis of Kargil Formation have a general East West trend, except for the Karit area where North East - South West trend is observed. Near Kargil the folding is essentially open in the purple grey facies but tight in the olive grey facies".[25]

Thus, it becomes clear from the study of stratigraphy, tectonics and structure of Kargil that rocks have been subjected to considerable tectonic movements and that Geological evolution and stratigraphy are responsible for the physiographic alignment of the area.

Physiography

"The highly elevated territory of Ladakh, with its alternating valleys and mountain ranges is highly complex area from the physiographic point of view.[26]

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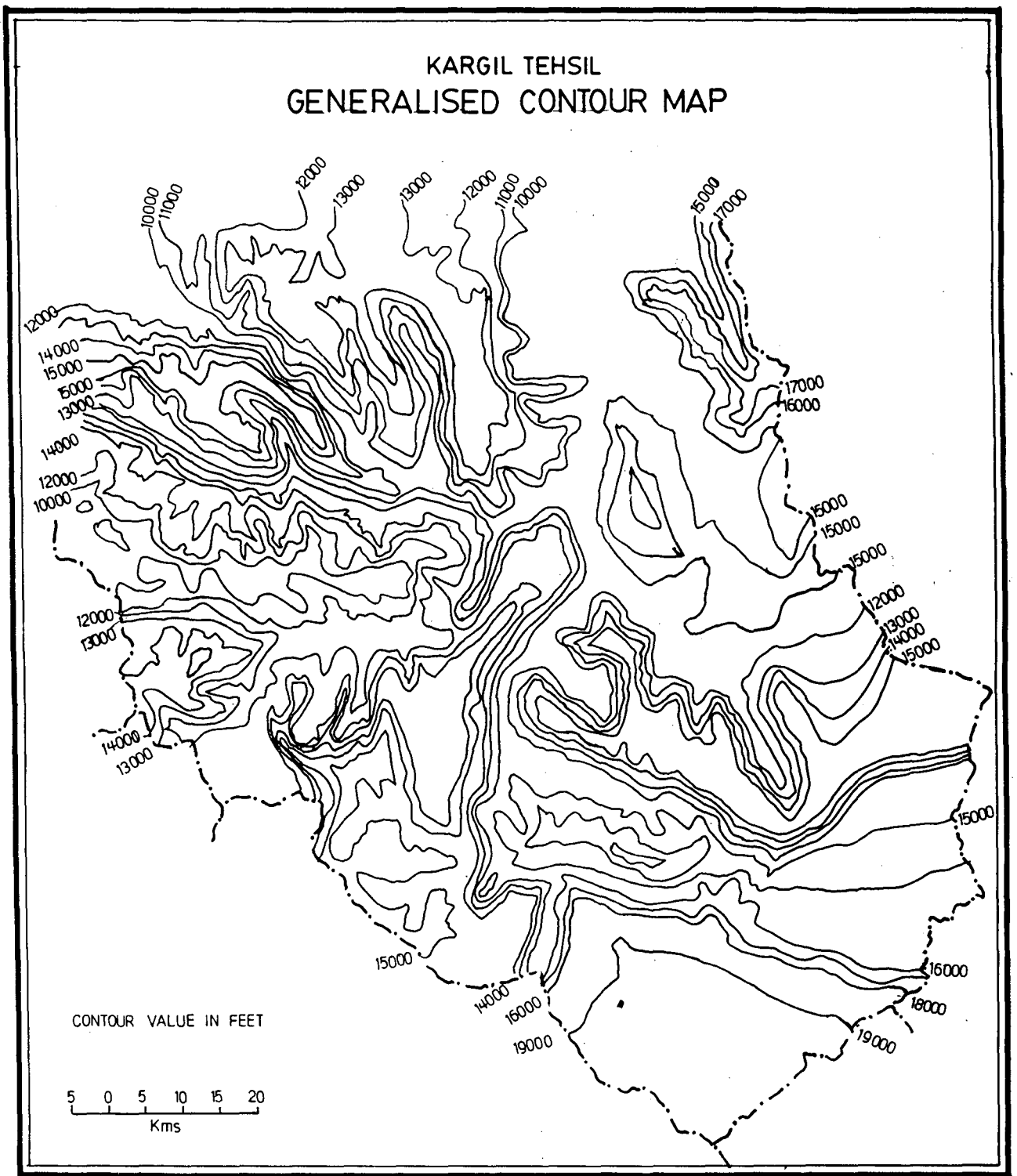
24. Ibid., p.147.

25. Ibid., p.149.

26. H.Singh, Ladakh-Analysis of its Regional Structure - A Preliminary Enquiry, unpublished M.Phil Disst. J.N.U., New Delhi, 1972, p.23.


KARGIL TEHSIL
GENERALISED CONTOUR MAP
CONTOUR VALUE IN FEET
5 0 5 10 15 20
Kms

Map . II-3

Same appears to be true to Kargil tehsil which is a part of Ladakh. The generalised contour map (2.3) reveals rugged mountain character of the region.[27] The elevation increases towards the South Eastern and North Western parts of the tehsil. The areas along the Ladakh range in the North Eastern part of Kargil are more elevated than its western parts. It can be seen clearly from the map that western parts of the tehsil where it touches the Zansker tehsil elevation increases. The general slope is from North West to South East and it becomes steeper towards South East .

The ruggedity of the mountains as shown by the generalised contour map was further examined more minutely by calculating and mapping the ruggedity Index [28] and

---

27. Source 1:250,000 toposheet No. : NI 43-7.

28. The ruggedity Index "R" was calculated by super imposing an inch grid over the topographic sheet and calculating the product of number of average contour crossings per mile by the number of drainage crossings per mile, for each grid. As explained by K.P. Dhurandher, "A more rational approach to the determination of slopes of land surfaces," The Indian Geographical Journal, Vol. 55(1980), p.37-48.

working out slope zones.[29]

The ruggedity Index reveals the relationship between the slope and number of drainage lines per unit area , "the higher the values of the Index the steeper slopes and more erosion as compared to the area with a low value."[30] The calculated ruggedity values were converted into isopleths map (2.4) . The values range from less than 0.4 in the North and South West to over 2.0 in the central part between village Rangdum and village Ichu. Similarly, higher values of ruggedity in the range of 1.6 to 2.0 came up for the North Eastern part of tehsil around the villages of Lalung, Apati and Yourbaltak. The higher values of ruggedity obtained probably indicate that the settlements there are situated at steeper slopes and drainage is more developed than the areas having low ruggedity index values.

The general picture emerging about ruggedity of Kargil from the exercise shows that about 70 per cent

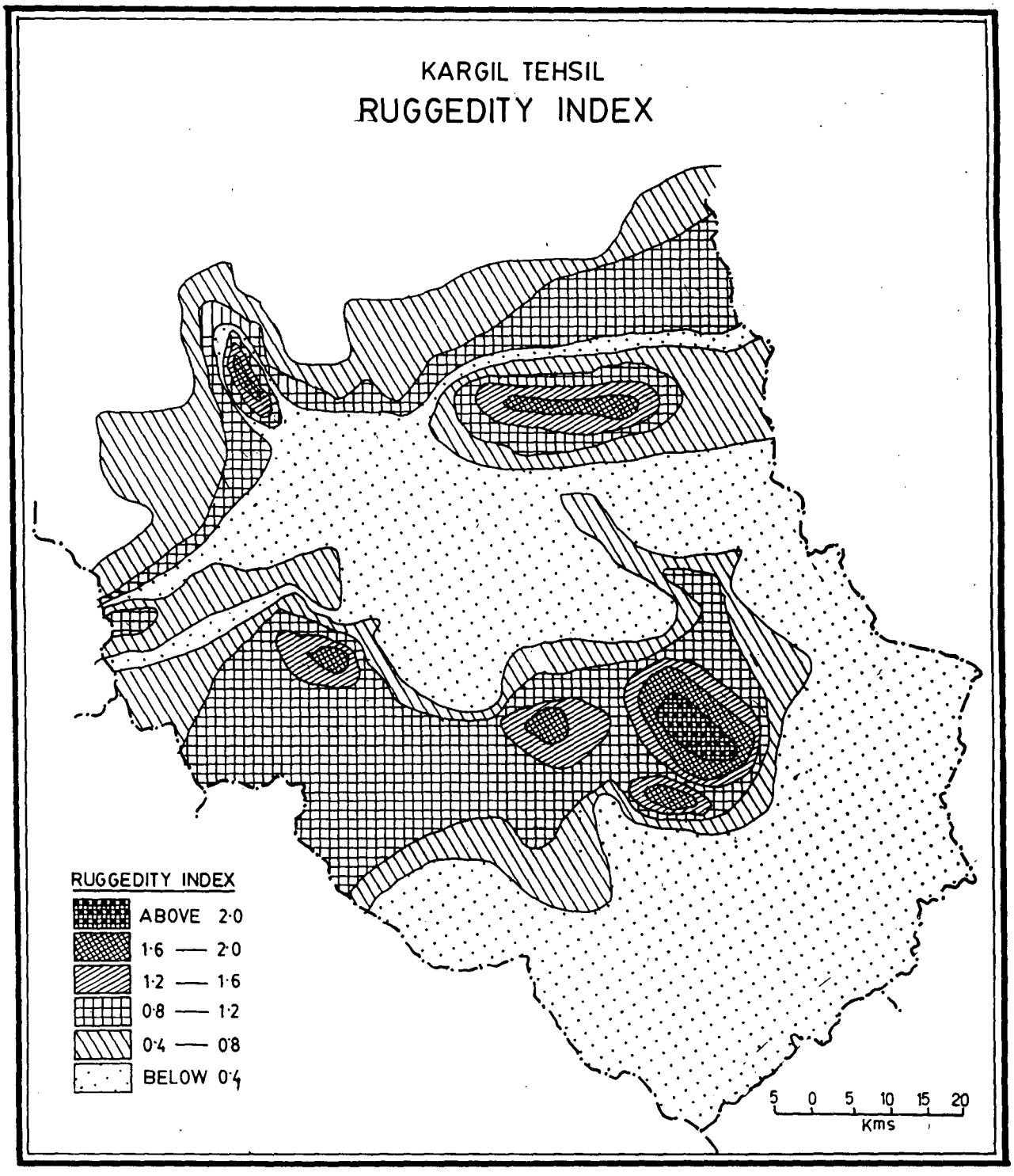
---

29. The slopes were calculated using wentworth's formula that

$$\text{Average angle of slope} = \tan^{-1}\frac{\text{avg. no. of contour crossing per mile} \times \text{contour interval.}}{3361\,(\text{constant})}$$

the constant 3361 is the mean of all possible values of sine which is the angle between the grid lines and contours. C.K. Wentworth "Simplified Method of Determining the average slope of land surfaces" American journal of Sciences, Series 5, Vol. 20, New Haken, Conn, 1930.

30. Sandhya Gokhale , op.cit., p.60.


KARGIL TEHSIL
RUGGEDITY INDEX
RUGGEDITY INDEX
ABOVE 2·0
1·6 — 2·0
1·2 — 1·6
0·8 — 1·2
0·4 — 0·8
BELOW 0·4
5 0 5 10 15 20
Kms

Map - II. 4

of the tehsil has low index value i.e. less than 0.4. The ruggedity Index value of 0.4 to 0.8 covers another 15 per cent area of the total region and the rest has "R" value ranging from 0.8 to 2.0 and above.

Map 2.5 shows Slope zones which were obtained by calculating average slope angle for each grid and by converting them into isopleths. The slope analysis of land in mountain lands acquires greater significance as it determines the nature and extent of land available for various human activities. There are large tracts in the Eastern portion of the tehsil touching the district of Leh and Zanskar tehsil which have relatively gentle slope. The slope is more in the Dras valley than in Suru and Wakha areas. The average slope of more than 20° was noted near the village Haripora. In general, the Western portion of the tehsil are more rugged as average slope varies between 5° to 20° and above(Map 2.5) while the Eastern portions of the tehsil , the average slope ranges from 5° to 15°. In general, the low slope zone corresponds with river valleys of the tehsil.[31]

31. The slope analysis persented however failed its to present the actual position of slope in the area, as field work experience revealed that slope changes abruptly in entire Ladakh. The picture thus presented reveals only general trend and not actual position.

The analysis of ruggedity index and slope zones show that the less rugged areas having gentle slope are confined to the river valleys. All 104 villages of Kargil tehsil are situated within these valleys. Hence, a description of the river valleys of Kargil which are the embryo of the socio-economic activities and of the mountain ranges which set limits to the occurance of settlements and narrow downs the domain of human occupance becomes necessary. Mountain ranges are the more important positive physiographic features but have little direct significance for human settlements. It is the river valleys in mountain ranges which accommodate all human activities as all basic pre-requisites for the evolution and sustenance of settlements are found therein. For any settlement of to survive in this cold mountainous desert , the following are the prerequisites:-

i. Relatively flat land which could be levelled or terraced.

ii. Comparatively lower altitude where temperature is high enough to permit the seeds to germinate and plants to grow.

iii. Adequate soil cover to sustain plant roots as large areas are bare rocky surfaces.

iv. Availability of water as irrigation is a basic requirement due to limited precipitation that too occurs mainly during winter months which is an agriculturally off season.[32]

The abovementioned conditions are met mainly in the river valleys particularly on the valley floor, river terraces and alluvial or talus cones. From above discussion it becomes imperative that in order to understand the socio-economic characteristics of settlements, it is important to comprehend the lay of the land especially in terms of mountain ranges and valleys.

Mountain Range:

The following mountain ranges traverse the Kargil tehsil and add to its complex terrain.

North Eastern Slopes of the Great Himalayan Range:

It acts as a physical boundary between the Kargil tehsil and the adjoining districts of Doda, Anantnag and Srinagar of Kashmir valley to its South West. The mountain range exhibits contrasting physiographic characteristics on its North Eastern and South Western slopes.

---

32. This section is based on Harjit Singh's, "Environmental Constraints on Agriculture in a Cold Desert: A Case Study of Ladakh." Perspectives in Agricultural Geography edited Noor Mohammad, Concept Publishing Company, New Delhi, 1981, p.25-39.

The North Eastern slopes have dip and strike towards Kargil tehsil, these are rocky and almost devoid of vegetation and of human life, those on the South Western side are covered with forest. The crest and the peaks of this range remain perpetually covered with snow. Dras and Suru rivers of the Kargil are fed by the glaciers found on the North Eastern slopes. Nun Kun peaks (7135,8637 mts) high are situated near Parkachik village . These form the culmination of the range.[33] This mountain wall has been acting as a gateway to Ladakh since ages. Some of the important passes found in the range include BaraLacha La(4391 m), Shingola(5091 m), Sursarv pass (5375 m), Poalta(6716 m), Umasila(5294 m), Chilung La (4401 m) and the famous Zojila (3529 m)[34] The limits of the westward termination of the Great Himalayan Range are not clear and it is difficult to demarcate it with help of topographical sheets as all ranges in the Western part of Kargil tend to get fused. Even the trignometrical observations failed to indicate it.[35]

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33. H. Singh, op.cit., p.25.

34. Source 1:1 million toposheet of Ladakh area.

35. Burrad and Hayden, A Sketch of Geology and Geography of the Himalayas, 1907, p.79.

II.1 A Talus cone.

II.2 Glacio- Fluvial Action.

II.3 Glacio- Fluvial Action.

Zanskar Range:

The Zanskar range runs parallel to the great Himalayan range and encloses the Dras, The Suru, Wakha and Zanskar river valleys. This range is highly elevated and Eastern parts are highly glaciated. The important passes of Zanskar range connecting Kargil district with Leh District are, The Purifila(3950m), Namtsela(4350 m), Charchala (5648m). The Pensila pass (4400m) connects the Kargil tehsil with Zanskar tehsil situated to its South East.

On the whole the range consists of bare rocky surfaces with irregular cliffs, scree slopes, loose rocks and accumulated debri found at its foot. These attest intense dendudation weathering and frost action occuring in the range. The lower part of the ranges is marked with a series of glacio-fluvial cones and talus fans.

Ladakh Range:

Ladakh range runs parallel to the Zanskar range and traverses the Kargil tehsil along its North Eastern boundary. The range stretches from the Indus-Shoyk confluence upto the Western border of Tibet,[36] and more than 90 per cent range falls in

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36. H.Singh, Ladakh - Problems of regional development in the context of growth point strategy, unpublished Ph.D thesis, J.N.U., 1978, p.23.

the Ladakh district, where it is being flanked by the Indus river to the South and by Shyok river to its North. Near Garkon village Indus has created a deep groge in the crystalline rocks immediately after its entry into the Kargil tehsil.

River Valleys:

After having studied the mountain ranges traversing the Kargil tehsil, description of the river valleys providing backbone to the socio-economic structure of Kargil tehsil becomes necessary. As stated earlier, the river valleys in Ladakh region are the centre of all socio-economic activities and all the settlements are restricted to these. The following river valleys accommodate most of the settlements of Kargil tehsil:

i. The Dras river valley
ii. The Suru river valley
iii. The Wakha river valley
iv. The North Western parts of the Indus valley.

The Dras Valley:

The Dras river valley starts from the Zojila and extends upto the Kakshai. Upto this point, the length of the river valley measured from the Zojila pass upto Kakshani is 75 km(Table 1). The valley contains 20 villages of the Kargil tehsil which accounts for 19.23 per cent of the total villages.

Table II.1 VALLEY WISE DISTRIBUTION OF VILLAGES

River Valley	Length of main river	Number of villages in the valley (percentage of total villages of the tehsil)
Dras valley	75 kms	20(19.23%)
Suru valley	120 kms	48(46.15%)
Wakha valley	60 kms	20(19.23%)
Indus valley (North Western parts falling in Kargil tehsil)	-	16(15.39%)

Source - (1: 250,000 toposheets)[37]

In its upper reaches Dras valley runs parallel to the Suru river valley. The river Dras joins the Suru river at Kharal. Average width of Dras river valley at Dras is around 3 kms.

37. This table was prepared by delimiting the Basin of these rivers and by counting the number of villages falling within it. 1:250,000 topographical sheets were used for this purpose.

The Suru Valley:

The Suru valley lies to the East of the Dras and it seperated from latter by a ridge.[38] The river originates from the Northern slopes of the Great Himalayan range around Pensi-La and its total length is around 120 kms. The Suru river valley is wider than that of Dras and contains 48 villages which forms 46.15 per cent of the total villages(Table II.1). This valley is one of the most fertile in the entire Ladakh region.

The Wakha Valley:

The Wakha forms the third important valley of Kargil tehsil. The Wakha valley is the creation of two rivers i.e. Wakha - Chu and Phugal both of these originate around area having grid location of 33° - 45' N latitude and 76° - 30' E longitude.[39] Wakha river joins the Suru river at Chanchi immediately below Kargil town and thereafter the waters of the two rivers meet the combined waters of Dras and the

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38. H.Singh, op.cit., p.34.

39. A. Cunningham, Ladakh, Physical, Statistical and Historical, Sagar publication, New Delhi, 1970, p.98.

Shingo rivers at Khural. The Wakha valley supports 20 villages which comprise 19.23 per cent of the total villages of the Kargil tehsil. The length of main river is 60 kms. (Table II.1).

The North Western Portions of the Indus Valley:

The North Western portions of the Indus valley falls under the administrative Division of Kargil tehsil. It contains 16 villages of Kargil which are 15.38 per cent of the total villages. The length of Indus valley in Kargil tehsil is 50 kms and most of the valley floor is composed of rocky regolith.

From the above discussion, it becomes obvious that due to mountainous terrain, ruggedness and steep slope of land, all the settlements in the tehsil are confined to the river valleys. The river valleys are comparatively flater, have easy access of water and provide land which is comparatively fertile than the land on higher slopes. All agricultural practices are confined to the lands which are flat, have easily available water for irrigation and adequate soil cover. Out of a total of 8282 sq km[40]

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40. Area was calculated byplanimeter using 1:250,000 toposheets.

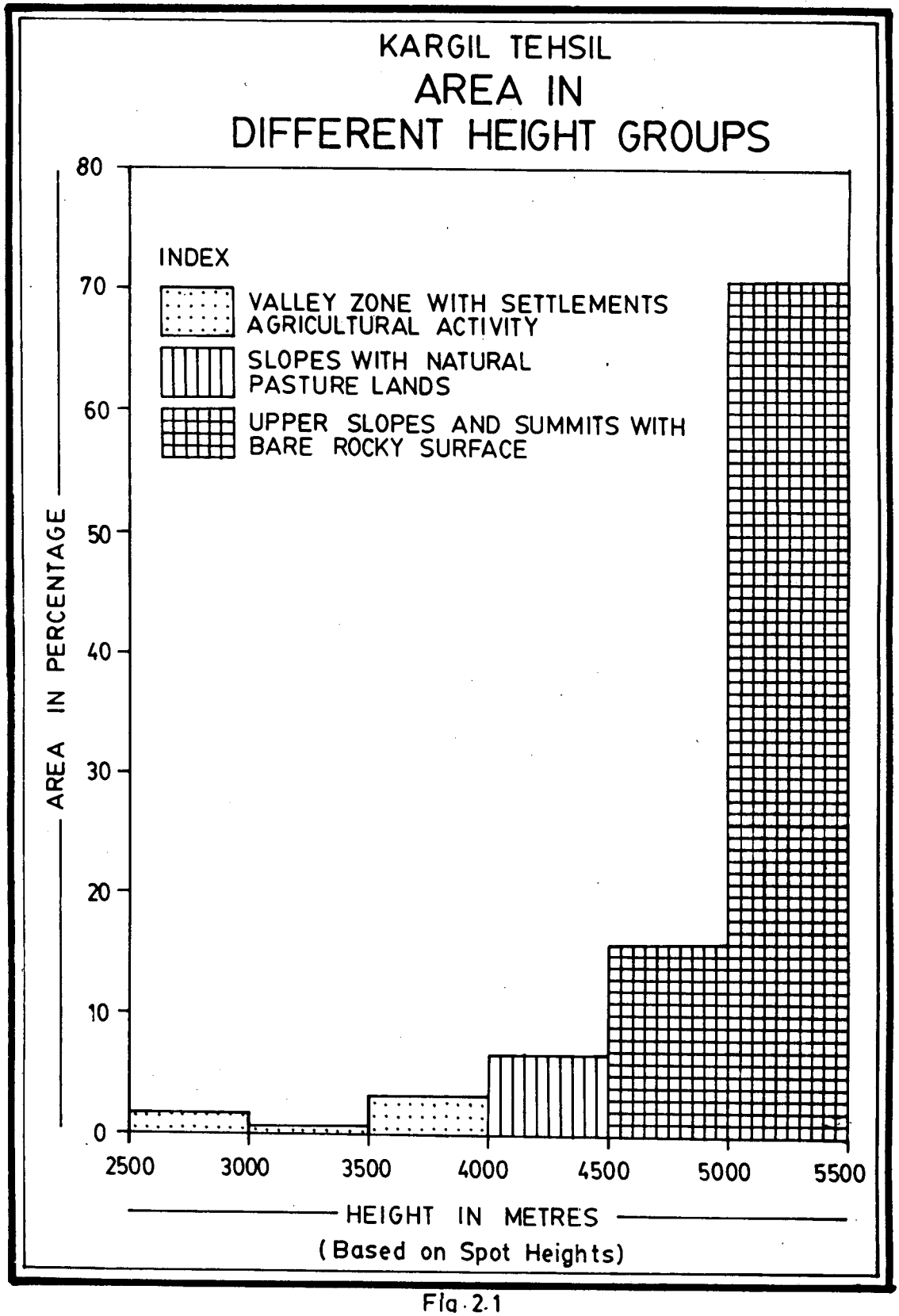
KARGIL TEHSIL
AREA IN
DIFFERENT HEIGHT GROUPS
INDEX
VALLEY ZONE WITH SETTLEMENTS AGRICULTURAL ACTIVITY
SLOPES WITH NATURAL PASTURE LANDS
UPPER SLOPES AND SUMMITS WITH BARE ROCKY SURFACE
AREA IN PERCENTAGE
80
70
60
50
40
30
20
10
0
2500
3000
3500
4000
4500
5000
5500
HEIGHT IN METRES
(Based on Spot Heights)

Fig. 2.1

of the geographical area of the tehsil only 146.1 sq kms have been reported as assessed area.[41] Thus, only 1.77% of the total geographical area is under direct human use. So, an analysis of the available land resources and the soils of the tehsil becomes necessary as it is only a small portion of land that supports the entire population of the tehsil and hence all socio-economic attributes.

Land Resources and Soils

Table(II.2) and Fig. (II.1) clearly show that land available for human use in the Kargil tehsil are limited. Both show that approximately 6% of the total tehsil area lies below the altitude of 4000 m which is generally the upper limit for all villages. On the basis of the altitudinal variation three broad zones can be identified as shown in Fig. (II.1).

Zone A lying 2500-4000 mts is the valley zone parts of which sustain agriculture. This zone contains all the 104 villages of the tehsil and hence the total population.

Zone B lying between 4000-4500 mts in the zone where many natural pastures are found. This zone

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41. District Census Hand Book of Kargil - 1981.

II.4 Glaciation

II.5 Glaciation.

is being used for grazing purposes during summer months.

Zone C comprises of all the land lying above 4500 mts. This zone covers more than 87% of the total land area of the tehsil and is unfit for permanent settlements and agriculture activities. This zone is important in the sense that it has glaciers source of water for rivers, which irrigate the lower zones.

Thus , it is the valley zone that is most important in terms of land resources. Within this valley zone also only 146.1 sq.kms is the accessed area as stated earlier, and only 87.54% of this is under cultivation.

Table II.2 ALTITUDE ZONES

Altitude	Zone	Area (sqkm)	Cumulative area (sq.km)	% Area	Cumulative % Area	No of village in Alt. zone
2500-3000	A	140.79	140.79	1.70	1.70	4
3000-3500		71.2252	212.0152	0.86	2.56	97
3500-4000		283.2444	495.2596	3.42	5.98	3
4000-4500	B	566.4888	1061.7484	6.84	12.82	-
4500-5000	C	1344.988	2406.7164	16.24	29.06	-
5000 and above		5875.2508	8281.9672	70.94	100.00	-

A = Valley zones with settlements and agricultural activity.
B - slopes having natural pastures
C - upper slopes and summits having barren peaks.

II.6 Bare Rocky Slopes.

This is mainly due to the thin soil cover and acute scarcity of water that cultivable land is limited. The mountainous terrain, ruggedity and steep slope has resulted in the absence of extremely thin soil cover, soils to be confined to the valleys and to the pasture lands having gentle slope. The higher summits and the mountain ranges are generally bare rocky surfaces.

In general two types of soils are found in the tehsil:

a. The skeletal soil

b. The mountain meadow soil

The Skeletal Soil:

This is an area of extremely thin soil cover. Soils have coarser texture. This type more or less is confined to the areas of upper slopes and summits. The soil consists of rock fragments and is unsuitable for agriculture.

Mountain Meadow Soils:

Mountain meadow soils are comparatively more suitable for human settlements, cultivation and for the growth of natural grasses. This soil is found mainly in river valleys and on moderate and gentle

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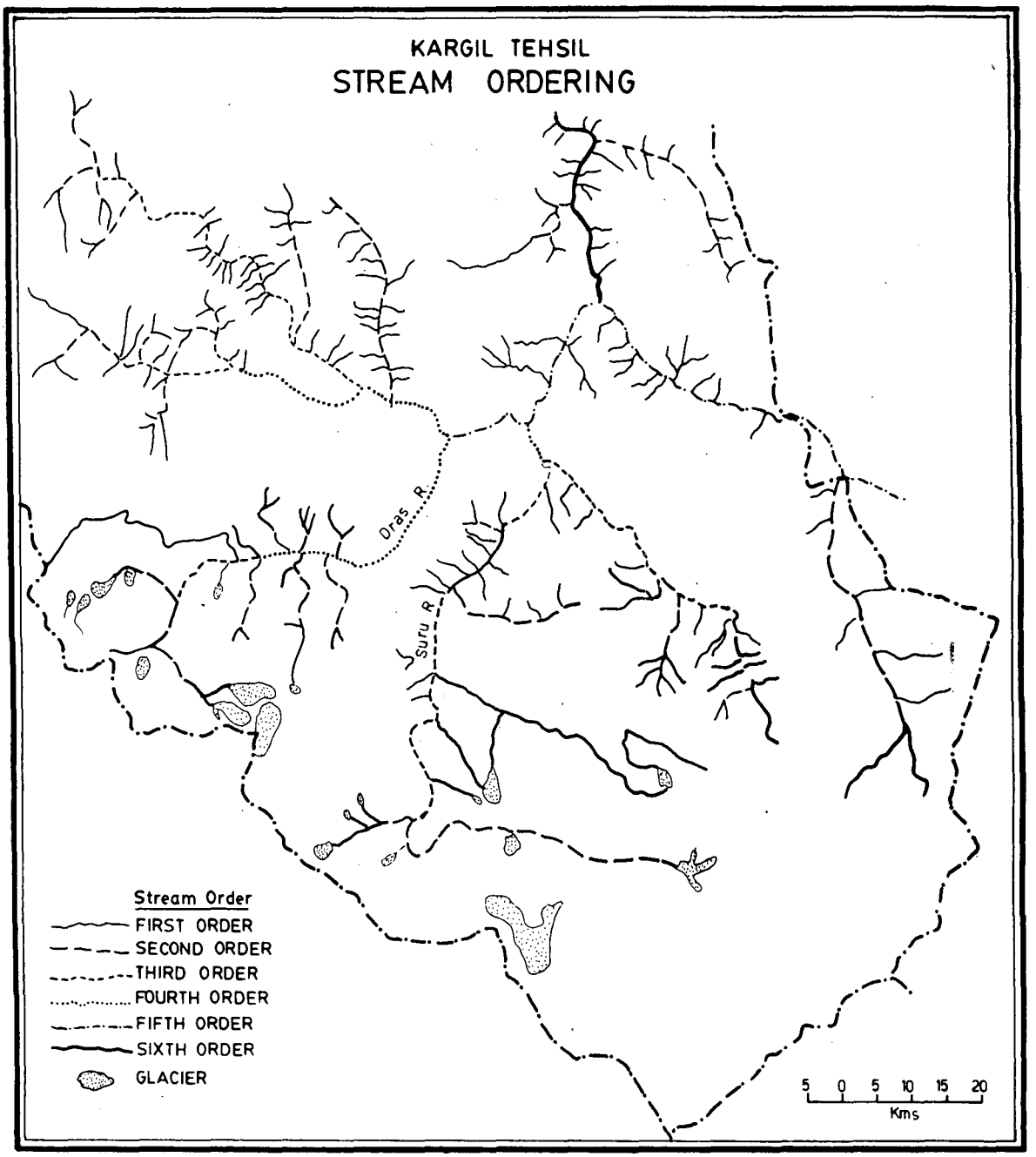
42. H. Singh, op.cit., p.48.

sloping areas. The texture of the soil is fine on the alluvial Fans and river terraces compared to those found on upper slopes which have coarser texture. The soil texture becomes coarser as the altitude increases. Large areas under this soil in the lower parts of valley has been brought under plough whereas higher parts covered by the soil are used as pasture land for grazing purposes during summer months.

In general the soils of the Kargil are poor in moisture content because of intense insolation, and rapid radiation and airdity of the region. Moreover, their moisture retaining capacity is low.

Drainage and Water Resources

Water plays an important role in determining the site for human habitation and settlements in areas like the cold desert of Ladakh. As stated earlier , the availability of water is one of the pre-conditions necessary for the survival of settlements. All the settlements in Kargil tehsil are situated in the close proximity of water bodies . The study of drainage patterns and basin characteristics thus attains a great importance as these indirectly reveal the water resource potentials which can be harvested or are being


KARGIL TEHSIL
STREAM ORDERING
Dras R.
Suru R.
Stream Order
FIRST ORDER
SECOND ORDER
THIRD ORDER
FOURTH ORDER
FIFTH ORDER
SIXTH ORDER
GLACIER
5 0 5 10 15 20
Kms

Map. IL·6

harvested for various purposes. The following section therefore includes an analysis of drainage characteristics and water resources of the Kargil tehsil.

The Kargil tehsil is mainly drained by the waters of the Dras , the Suru , the Wakha' , the Shingo and the Indus rivers. The drainage pattern carved in the tehsil shows marked variations(map II.6). The dominant drainage pattern is that of dendritic type in the Dras basin. It is characterised by irregular joining of tributary streams. It shows varied lithological conditions. The Suru river shows a parallel patern in its upper course while Wakha river and its tributaries again exhibit dendritic pattern. Trellis pattern is shown by Indus and its tributries in the Kargil tehsil and most of the streams join the master stream at rightangles. The drainage pattern in Shingo river basin is rectangular in upper courses and approaches towards dendritic pattern as the river approaches the Dras river. The trellis and rectangular patterns reflect the role played by faults and joints which are numerous in Kargil.

The drainage characteristics of Kargil tehsil were further analysed by working out stream orders.[43]

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43. Stream orders are assigned using Stahlers method. In this method all finger tip channels are designated as first order streams. Two first order streams meet to form second order streams and so on. A.N. Strahler, Physical Geography, iv edition, John Willey & Sons, New York, 1975, p. 455-56.

Map 2.7 and Table 2.3 gives the streams orders for each basin as well as for Kargil region as a whole.[44]

It is obvious from Table(2.3) that first order streams predominate in all the basins as well as in the Kargil region. In all, there are 246 first order, 40 second order, 3 fourth order, 2 fifth order and I sixth order stream in the Kargil region.[45]

The bifurcation ratio (Rb) were calculated for Kargil region and for each of its basins.[46] Table 2.3 shows that bifurcation ratio(Rb) for Kargil region varies from 6.15 to 2. The average value of 'Rb' for second, third and fourth order streams of Kargil basin is 2.98 which shows that this part of the basin is flatter and

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44. The Kargil tehsil as shown by the drainage map is drained by the Dras, the Suru, The Wakha , the Shingo Shingo, and the Shiggar rivers. All these rivers are in fact the tributries of Indus river within the Kargil tehsil. These rivers have drainage basins in Kargil which are part of Indus basin.

45. Stream order of 5 is given to Indus river entering the Kargil tehsil near Garkon. After H.Singh, op.cit., Ph.D,p .42, map II.8.

46. Bifurcation ratio(Rb) between successive stream orders were calculated using the formula $Rb = \frac{Nu}{Nu+1}$, where Nu= stream order after A.N. Stralher, op.cit., p.456. This ratio is of fundamental importance in drainage basin analysis as it is the foremost parameter to link with hydrological regime of a water shed under uniform lithological and climatic conditions , and helps in understanding the bed rocks and the disection of the drainage basins.

this perhaps explains the presence of large number of settlements therein . This area has constant supply of water.

Natural drainage was further analysed by calculating drainage density(D)[47] Drainage density gives the character of underlying lithology in an area and is directly related to the amount and intensity of precipitation and inversely to the amount of vegetation cover.[48] The drainage density value for the Kargil as a whole is 0.163 while that for the basins of the Dras, the Suru and the Shingo, the values are 0.149,0.153 and 0.211 respectively. The low values of drainage density (D) in all the basins and Kargil region can be attributed to the aridity of the region.

From the analysis of the natural drainage of Kargil it becomes clear that it has a low drainage density, high bifurcation ratio, predominance of first and second order streams. These reflect scarcity of water

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47. Drainage density is defined as total stream length per unit area of the basin. Horton, R.E., "Drainage basin characteristics", Transactions of the American Geophysical union, Vol. 19, 1932, pp. 350-61.

48. R.J. Chorley, "Climate and Morphometery" Journal of Geology, Vol. 65, 1958, pp. 628-638.

TABLE - 2.3 KARGIL BASIN DRAINAGE CHARACTERISTICS

Drainage Basin/ Subbasin	Number of stream segments		Stream order	Bifurcation ration (Rb) $Rb = \frac{Nu}{Nu+1}$	Stream length		Basin area (sq.km)	Drainage Density (D)
	Nu	%			Sq.km	%		
DRAS Basin	41	(71.92)	1st	-	85	(42.5)		
	11	(19.29)	2nd	4.1	55	(27.5)		
	4	(7.01)	3rd	2.7	30	(1.5)		
	1	(1.75)	4th	4	30	(1.5)		
							1338	(0.149)
	Nu 57	(100)			L=200	(100)	1338	(0.149)
Suru Basin (including Wakha sub-basin	61	(81.33)	1st	-	125	(36.23)		
	11	(14.67)	2nd	5.5	115	(33.34)		
	2	(2.67)	3rd	5.5	100	(28.99)		
	1	(1.33)	4th	2	5	(1.4)		
							2257.6	(0.153)
	Nu 75	(100)			L 345	(100)	2257.6	(0.153)

Contd...

TABLE 2.3(Contd)

Drainage Basin/ Sub-basin	Number of stream segments		Stream order	Bifurcation ratio(Rb) $Rb = \frac{Nu}{Nu+1}$	Stream length		Basin area (sq.km)	Drainage Density (D)
	Nu	%			sq.km	%		
Shingo river basin (including Shiggar river basin)	83	83.83	1st	-	180	(45.46)		
	12	12.12	2nd	6.92	90	(22.78)		
	3	3.03	3rd	4	95	(24.05)		
	1	(1.01)	4th	3	30	(7.59)		
	Nu=99	100			L=395	(100)	1873.6	(0.211)
Kargil region (includes the above mentioned sub basins + over land flow + The part of Indus basin that falls into Kargil tehsil	246	(81.72)	1st	-	620	(45.92)		
	40	(13.28)	2nd	6.15	340	(25.18)		
	9	(2.96)	3rd	4.44	225	(16.66)		
	3	(0.99)	4th	3	65	(4.82)		
	2	(0.66)	5th	1.5	55	(4.07)		
	1	(0.33)	6th	2	45	(3.34)		
	Nu=301	100			L=1350	100	8282	(0.163)

resources in the tehsil. In the winter months most of the first and second order streams get frozen due to extreme cold especially in Dras valley. This further adds to the water paucity in the tehsil. Empirical observations and the study of toposheets reveal all the settlements to be situated in the valley at a little higher altitude than that of channel. Water for irrigation is generally diverted at a higher level from small side tributries. Thus small tributries that flow into the main rivers are the main source of water utilised for domestic and agricultural purposes. Water is diverted from streams through Khuls (narrow irrigation channels), to the agricultural fields. Thus, at the present level of available technology, water resources are limited.

Climatic Conditions

It is said about the climate of Ladakh that "a bare headed man sitting in the sun with his feet in shade may suffer from sunstroke and frost bite at the same moment".[49] This of course, is an exaggeration but it does give an idea about the extremity of climate of Ladakh. It is the result of its high altitude location intense solar radiation, local relief which lead to low precipitation, low temperatures and strong winds blowing

49. J.Rizvi, Ladakh Crossroads of High Asia(Oxford University Press, Delhi, 1983), p.24.

in the Ladakh. The hostile climate is reflected through its extreme cold and arid character marked by rarefed atmosphere. In this section therefore, an attempt has been made to analyse the climatic parameters responsible for the "High Land Type" of climate designated to Tibet and similar regions by Trewatha.[50]

Temperature and Humidity:

Table II.4 shows that maximum temperature at Dras ranges from -9°C in January to 23.7°C in July, while the minimum temperature varies between -22.2°C in January to 10.6°C in July. In Kargil the maximum lowest temperature is recorded to be 4.2°C for the month of January and highest in July i.e. 29.7°C. The low minimum temperature of -13.3°C is observed in January and high minimum in July i.e. 17.7°C. The mean monthly temperature ranges from -15.6°C in January to 17.1°C in July at Dras and the figures for the same for Kargil shows a variation from -8.7°C to 23.7°C for same months.

The climographs show that for seven months the temperature remains below freezing point at Dras and the relative humidity during these months ranges from 73 per cent to 81 per cent. Due to the heavy snowfall in winter months in the Pandras and Zojila area, from November to June, every year the road gets blocked at the Zojila Pass.

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50. C.N. Trewartha and L.H. Horn, An Introduction to the climate, Mc Graw Hill, Aukland, 1980, 5th edition, pp. 332-33.

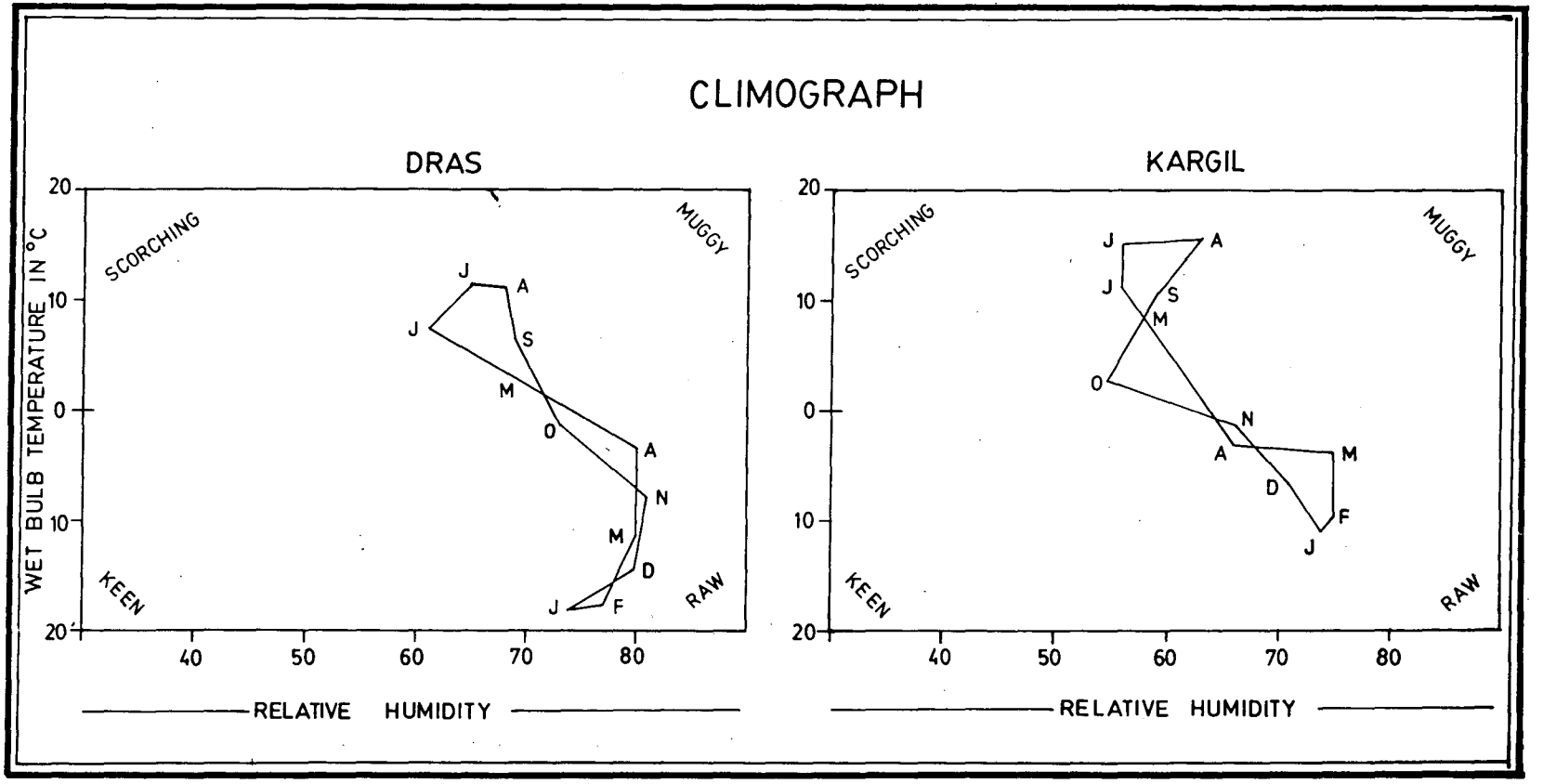
CLIMOGRAPH
DRAS
KARGIL
WET BULB TEMPERATURE IN °C
SCORCHING
MUGGY
KEEN
RAW
RELATIVE HUMIDITY
20
10
0
10
20
40
50
60
70
80
J
A
S
M
O
N
D
F

Fig · II·2

In Kargil, the conditions are slightly better as wet bulb temperature drops down below 0°C for the five months. The percentage relative humidity ranges from 54 per cent in October to 74 per cent in February. and March. The climograph tends more towards Raw corner in the Dras then in Kargil which shows that Dras is more colder than Kargil. (Fig.II.2)

Table II.4. MONTHLY DISTRIBUTION OF TEMPERATURE(°C)

Month	Dras			Kargil		
	max.	min.	mean	max.	min.	mean
January	-9.0	-22.2	-15.6	-4.2	-13.3.	-8.7
February	-6.7	-21.4	-14.05	-1.6	-12.1	-6.0
March	-2.0	-15.0	8.5	4.7	- 5.3	-3.0
April	5.4	- 5.2	0.1	14.0	- 3.4	8.7
May	15.1	1.5	8.3	21.6	9.4	15.5
June	20.5	5.6	13.5	25.7	13.4	19.5
July	23.7	10.6	17.1	29.7	17.7	23.7
August	23.6	10.5	17.05	23.9	17.2	23.05
September	19.6	5.9	12.7	24.9	12.5	18.7
October	12.8	-1.1	5.8	18.5	5.4	11.9
November	4.3	-8.6	-2.1	10.4	-1.3	8.5
December	-4.0	-16.9	-10.4	1.2	-7.9	-3.3

Source: Climatological tables of observatories in India (1931-60).

Table II.5-WET BULB TEMPERATURE AND RELATIVE HUMIDITY

Month	Dras		Kargil	
	Wet bulb temp. (°C)	Relative humidity %	Wet bulb temp. (°C)	Relative humidity %
January	-18.2	76	-10.8	74
February	-17.2	77	- 9.6	75
March	-11.1	80	- 3.7	75
April	- 3.5	80	3.0	66
May	3.5	68	8.3	58
June	7.7	61	11.3	57
July	11.4	65	15.2	57
August	11.1	68	15.5	63
September	6.3	69	10.7	59
October	-1.1	73	3.7	54
November	-7.7	81	-1.4	66
December	-14.4	80	-6.7	71

Source: Climatological tables of observatories in India (1931-60).

Precipitation:

The location of Ladakh in the rain shadow zone of the Trans Himalaya is the main cause of its aridity. The great Himalayan range acts as a climatic barrier to the moisture laden winds of the Indian monsoon and also to the winter snowfall. Most of the precipitation in the Kargil

occurs in the form of snow during the winter months and rain is very scanty.

As is clear from Table II.6 Dras receives an annual precipitation of 75.69 cms compared to Kargil where it is only 30.17 cms. There are only 32 "rainy" days at Kargil while at Dras it occurs on 54 days in a year.

Table II.6 MONTHLY DISTRIBUTION OF PRECIPITATION AND NUMBER OF "RAINY" DAYS.

Month	Dras		Kargil	
	Rainfall in cms	No. of rainy days	Rainfall in cms.	No. of rainy days
January	12.63	8.6	4.52	5.3
February	12.99	7.9	5.16	7.5
March	17.34	8.3	8.65	5.5
April	10.06	7.5	3.12	3.6
May	6.40	5.2	2.36	2.0
June	2.14	2.2	1.07	1.3
July	1.35	1.4	0.56	0.8
August	1.46	1.7	1.02	1.4
September	1.60	1.6	0.76	0.8
October	1.78	2.2	0.48	0.6
November	2.29	2.0	0.43	0.6
December	5.56	5.4	2.58	2.5
	Annual precipitation = 75.69	No. of rainy days in a year = 54	Annual precipitation = 30.71	No. of rainy days in a year = 31.9

Source: Climatological tables of observatories in India (1931-60).

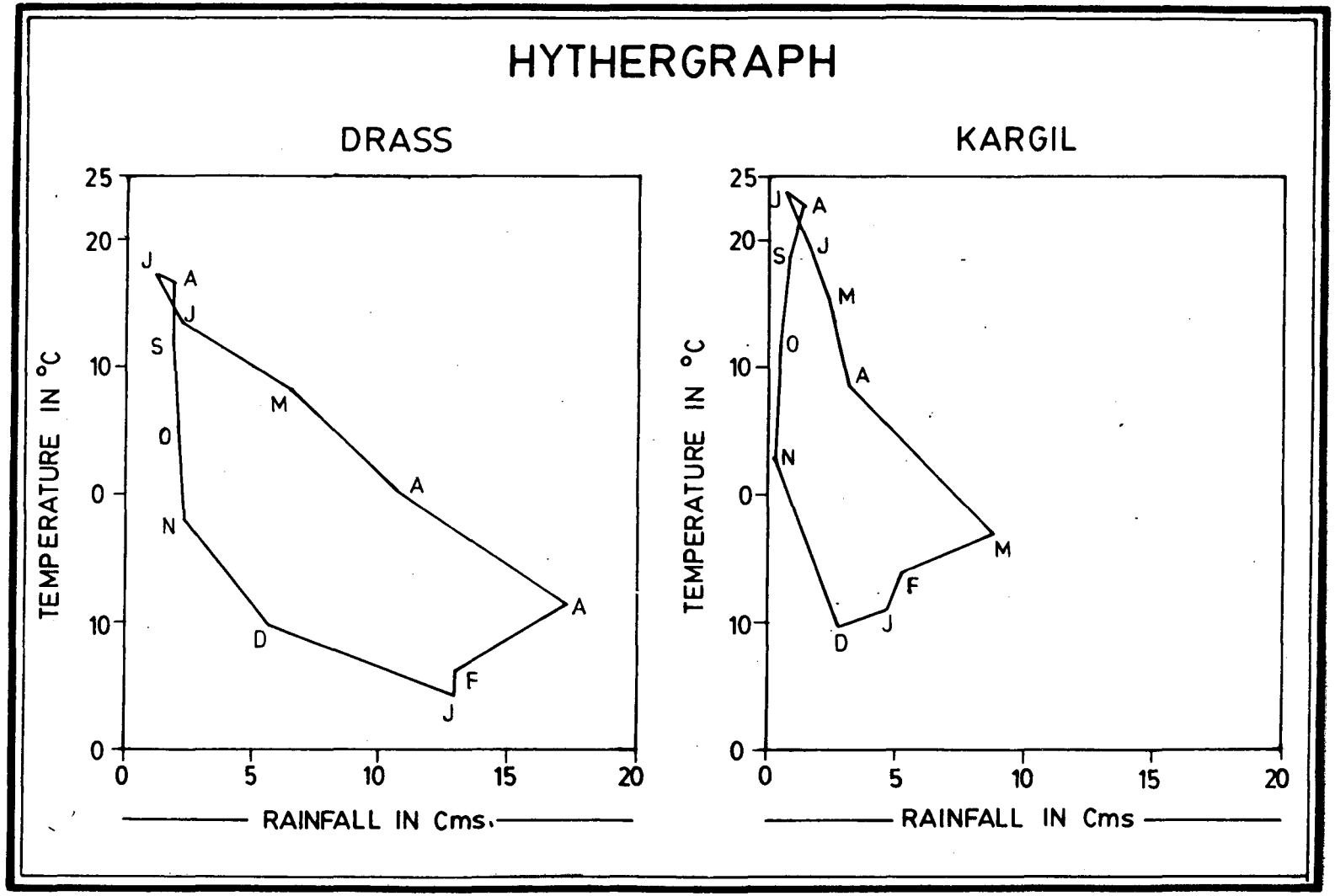
HYTHERGRAPH
DRASS
KARGIL
TEMPERATURE IN °C
RAINFALL IN Cms
25
20
10
0
0
5
10
15
20
J
A
J
S
O
N
D
J
F
M
A
M

Fig · 11·3

Hythergraphs show that maximum precipitation at Dras occurs in the month of March which is 17.34 cms and minimum in July which is 1.35 cms. Kargil receives a maximum of 8.65 cms of precipitation in March and minimum of 0.43 cms in November. The hythergraphs(Fig. II.3) reveal that as temperature increases there is a decline in the amount of precipitation and vice-versa. This perhaps enhances the importance of irrigation in Kargil because the crops can not be sown without irrigation and they grow only when temperature is high. The hythergraphs of Dras reveals that climatic conditions are uncomfortable for human activities during the months of January, February, March, April, November and December, while in Kargil only December, January and March are months of severe cold and the remaining months are relatively comfortable and favourable for economic activities.[51]

Natural Vegetation

There are no forests in the tehsil. This is perhaps due to the fact that the physiographic and climatic conditions of Kargil do not permit tree growth on significant scale. However, number of trees have been planted in the recent years by the forest department of

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51. It would have been interesting to analyse winds particularly in terms of velocity as these play important role as an element of climate in an area like Kargil. Unfortunately no detailed data is available for such an analysis.

the state, along water courses. But no data is available for tree plantation . The predominant varities found are Willows and Poplars. The natural vegetation of the tehsil consists of wild grasses, small bushes found on pasture lands and valley slopes. They are being used as green fodder in summer months. Plant Prangas found on the higher slopes of Dras valley is extensively used as a fodder plant in summer months.

Mineral Resources

Mineral development often acts as catalyst to Industrial development. Kargil tehsil like other parts of Ladakh is poor in mineral resources. The mineral reports reveal that gold bearing quartz veins have been found in the Dras, the Suru and the Indus valley of Ladakh.[52] In these areas gold is reported to get separated from these quartz veins due to the action of wind and chemical weathering. Particles of gold have also been reported as placer deposits in the rivers and streams of Dras valley and in terraces of the river Indus. Sporadic gold placers have been reported in Indus valley. According to the estimates alluvial Conglomerate deposits ranging in thickness of from 250 ft to 1000 ft can yield 0.57 tolas of gold per cubic

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52. Directorate of Geology and Mining, Srinagar, Mineral resources of J&K State(1971).

metres of thick conglomerate in the areas of Dras and Suru.[53] Besides Gold, Magnisite, and Chromium deposits have been reported by Geological Survey of India at Shergol and Kargil areas.

Though at present no mining activity has been taken over in these areas but it is hoped that with the improvement in technology the exploration and exploitation of these resources can be possible.

Thus the analysis so far presented reveal that Kargil is a backward mountainous area having limited resource base. Out of the natural environmental constraints discussed, climate emerges as the most powerful extreme cold conditions prevail in Kargil for over 5 months in a year. Severe winter, below freezing temperature and the cold winds in the area forces people to spend most of the time in inside their houses. As a result of this, the people take to spinning and weaving during the winter months. The climatic influences are also reflected by the food habits, house types and dresses of the people. People usually wear woollen clothes throughout the year but the thickness of the garments increases during winter months. Woollen caps called Patu Topi is an

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53. Geological Survey of India Report on Mineral Resources of J&K, (1967), Delhi.

important part of their dress, in winter months it protects against the forstbite of ears. Similarly, Feet hands, and other parts of body are covered by woolen garments mostly manufactured locally. Ladakhi's are very fond of their local tea "gur gur" and in the winter months an average adult consumes 10-15 cups of tea served with satu-ground roasted wheat and gram and it is a common belief that it increases the body temperature and is thus regular features of their food. The house types[54] and building constructions also reflect the impact of climate. The houses are built using stones and sun-baked mud bricks. These bricks provide a good insulation and are durable because of the low precipitation. The impact of climate is also revealed by the differences in the house construction in Dras and Kargil area. As mentioned earlier , Dras receives higher amounts of precipitation than Kargil and this is perhaps reflected in the differences in construction material of house in these areas. Housing in Dras valley are made of stones and mud bricks compared to sun dried bricks in Kargil area.

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54. House types and settlement Morphology have been discussed in detail in the Chapter-IV.

The inclement climate and mountainous terrain effect the economy of Kargil. The Kargil region being a primitive society has a subsistance type of economy. Though agriculture absorbs 60.4 per cent of the work force, but due to the environmental constraints it barely suffices the food requirement of natives. The natural environmental conditions and the resource base discussed affect to a greater extent the demographic and economic characteristics of population, spatial organization of settlements and their morphology and structure. These have been explained in the subsequent chapters.

CHAPTER - III

EVOLUTION OF SETTLEMENTS AND THEIR DEMOGRAPHIC AND ECONOMIC CHARACTERISTICS

In a simple society, settlements show human response to natural environment through which man overcomes the vagaries of the latter. Both physical and cultural factors play role in the successive stages of evolution of settlements. The process of evolution begins usually with the acquisition of territory followed by the creation of the production territory, establishment of settlement proper and finally the spread and diffusion of the settling process.[1] Settlements are, thus, a reflection of the sum total of human experience, organisation and the level of the available technology. These are modified by the people living and working within the territory in consonances with their changing needs and requirements. It is seen that in early stages of development settlements are evolved and are guided mainly by physical factors and these are generally simple in structure. Complexity in these begins with

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1. Neelam Grover, Rural Settlements : A Cultural Geographical Analysis - A Case Study of Northern Harayana, Inter-India publication, New Delhi, 1985, p.24.

development. Thus, in order to have a proper understanding of the settlements, it is essential to analyse their demographic and economic characteristics as during the evolution processes these keep changing. Therefore, the dynamics of settlements need to be viewed in a historical perspective. Its significance gets enhanced in a cold mountainous desert like Kargil where environment plays an important role in all aspects of life as the level of available technology is low. In the light of above, it is important to comprehend the following;

i. Historical evolution of settlements of the Kargil. The axiom is that these show imprints of different historical periods and of strong environmental constraints;

ii. Their demographic structure in terms of distribution, growth, sex ratio and literacy of population.

iii. Economic characteristics of settlements with regard to land use pattern and occupational structure.

These aspects have been studied at three points of time i.e. 1961, 1971 and 1981. The reasons for selecting these time points were that the data of 60's and 70's reflects the trend and position of Ladakh before the modernization and diversification of economy which

started in 1974. It was in 1974 that the region was opened to tourist.[2] The assumption thus is that data of 1961 and 1971 census reflects the pre-1974 position and that of 1981 of later developments. It may also be pointed out that the region came into limelight only after the Sino-Indian border dispute of 1962 which enhanced its strategic significance and led to the moving in of Indian Army in a big way and also construction of Srinagar-Leh Highway which was opened to regular traffic in 1966. Therefore, 1961 and 1971 data also show changes which came about due to these factors. The development processes got accelerated after 1974, perhaps in response to tourist Industry and also to meet the newly raised aspirations of the locals.

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2. Prior to 1974 entire Ladakh was a restricted area and no outsider was allowed to visit the region without permit. Outsiders in Ladakh till then were mainly the personnels of Indian Army and other Govt officials. Major changes in the region came about after 1974 because a very large number of foreign tourists were attracted by Tibetan form of Lamaistic Buddhism in Ladakh. Presently more than 20,000 foreigners visit Ladakh every year.

Evolution of Settlements

The present inhabitants of the study area are believed to be decedents of Monghols, Tarchhos, Mughmi, Brukpa, Mangriks and Kamini.[3] The earliest habitants of Ladakh region probably were an ancient tribe of Tibetan nomads, believed to have extended as far as Gilgit.[4] Their life probably in no way was different from that of Tibetan nomads of pre 1950s. They lived in tents made up of Yak-hair and subsisted on the produce of their herds of Yaks , goats and sheep.[5] Perhaps with the arrival of Mons,[6] from the north India and the Dards from the Gilgit the process of permanent

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3. District Census Handbook, Kargil District, 1981, p.10.

4. A.H. Franke, A History of Ladakh, with critical introduction and annotation by S.S. Gergan and F.M. Hassnain, Sterling Publishers, New Delhi, 1977, p.61.

5. Ibid., p.61.

6. Mons are the muscians found in every Buddhist village of Ladakh and are argued to be of Kashmiri origin by Franke, while Gargin and Hassnain believes them to be an Aryan race from north India but not from Kashmir.

settlements started in Ladakh. Probably the migrants from Dardistan who were the Dardi speaking people , found suitable sites for settlements near cultivable parts of Dras, Shimsha Kharbu and Suru river valley.[7] Thus it appears that cultivable areas of Dras and Suru valley were the earliest sites which the Mons and Dards occupied for their settlement and for their herds. The colonisation of western Tibet by the Mons and Dards met with no opposition from the Tibetan nomads.[8] By the 800-950 A.D. all the irrigable valleys of western Tibet had been brought under cultivation by the Aryan tribes of Mons and Dards.[9] It was perhaps due to free barter system between the Dard presents and the Tibetan nomads that a new group came up combining agriculture with nomadism. The basis of barter was the fact that the products of fields were as welcome to the Tibetan nomads as were the produce of herds to the Dard peasants. The lively barter

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7. A.H. Franke, op.cit., p.14.

8. Ibid., p.67.

9. Ibid., p.78. Why the position of Mons became so much lower than that of Dards is not quite clear. The possible explaination is that hostilities spray up occassionally between Dards and Mons , and that Mons were subdued in this struggle, as explained in A.H. Franke, op.cit., p.67.

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8. Ibid., p.67.

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establishment of settlements more and more people get attracted to these on one hand and natural growth takes place on other. In initial stages, settlements come up basically for dwelling purposes but with development other functions such as market, education and transport etc also grow. It is obvious that population and settlement characteristics are interrelated. Socio-economic characteristics of a region are influenced and governed by the basic features of its population which in turn affect the rate of development both in the economic and social spheres on one hand and are result of some of these processes on the other. It is important because "all analysis of population is an understanding of regional differences in the earths covering of people."[12]

Distribution of Population:

The distribution of population in the high altitude areas of Kargil is very greatly influenced by the physical conditions of ruggedity availability or otherwise of water and the soil conditions. Larger tracts of mountain lands experiencing inhospitable environmental conditions remain uninhabitated. As stated earlier settlements in such areas are usually

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12. C.B. Fawcett, "Whiter Population? Distribution and Trends of Movements", Geography, Vol. XXII, 1937, p.14.

confined to the river valleys which present relatively flatter land. The population therefore tends to get concentrated in favourable pockets within these valleys. This seems to be true for Kargil tehsil where most of the rugged terrain is uninhabitated and all settlements are restricted to river valleys. The total Geographical area of the tehsil is 8282 sq.km. with a population of 57675 persons. This population, however, is distributed in 102 villages and Kargil town which cover only 148.20 sq km area of the tehsil. It means that 98 per cent of the land is uninhabitated. Population is accommodated along the rivers in the Dras, Suru, Wakha and Indus river valleys of the tehsil. The Table III.1 shows the valley wise distribution of population.

Table III.1- Valley wise Distribution of Population

Name of valley	Approximate in area in sq.km.	Population[13]	Density of population	Percentage of population to total population
Dras Valley	1338	6544	5	11.35
Wakha	598	6404	11	11.10
Suru	1659.6	37952	23	65.80
Indus	2407.8	6775	3	11.75

13. The river basins were demarcated, and the population of settlements in each basin was added to obtain these figures.

The number of persons inhabiting a valley depends on width and length of the valley. The table shows that more than 65 per cent of total population of the tehsil is concentrated in the Suru Valley. This can be attributed to the fact that Suru valley is flatter and has a relatively lower altitude with reasonably thick soil cover. It accommodates 47 percent of the settlements of the tehsil and provides fertile agricultural land. Those valleys which cover less area of the tehsil i.e. Dras, Wakha sustain 22.45 per cent of the population combinedly. The Indus valley though largest in areal extent supports only 11.75 per cent of population. As revealed by the table, density of population is highest i.e. 23 in Suru valley and the lowest in Indus valley having a density of 3 persons per sq.km.

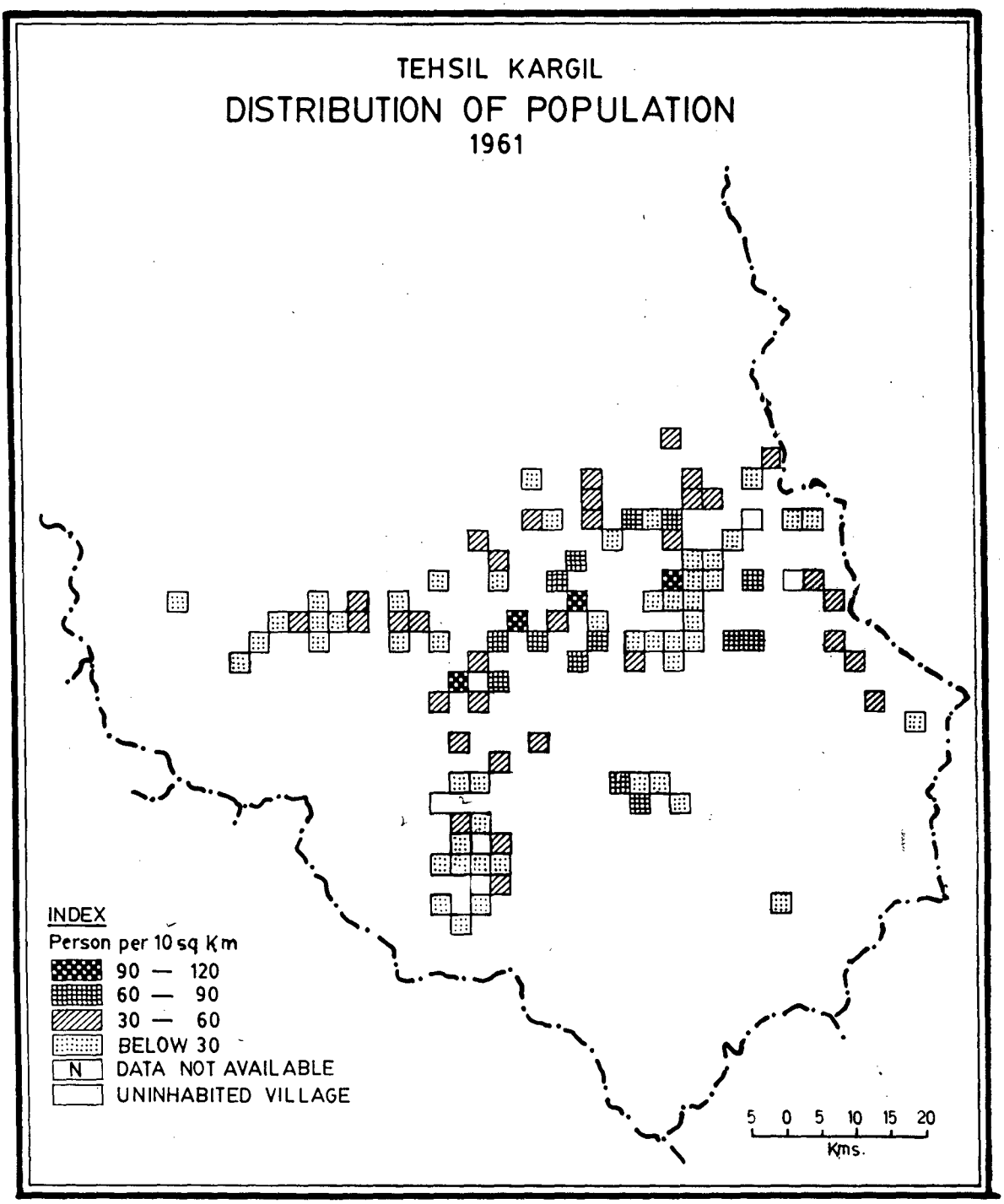
Table III.2 shows the changes that have occurred in the distribution of population over the years at block level. It is quite clear from the table that Sankoo and Kargil blocks together at all three time periods had more than 50 per cent of the population. This is due to the fact that these two blocks fall in the Suru river valley and hence the large concentration of population. The strong impact of environment and the length and width of the valley on population distribution is clearly reflected by the less population of block Tesuru.

Table III.2 Block wise Distribution of Population

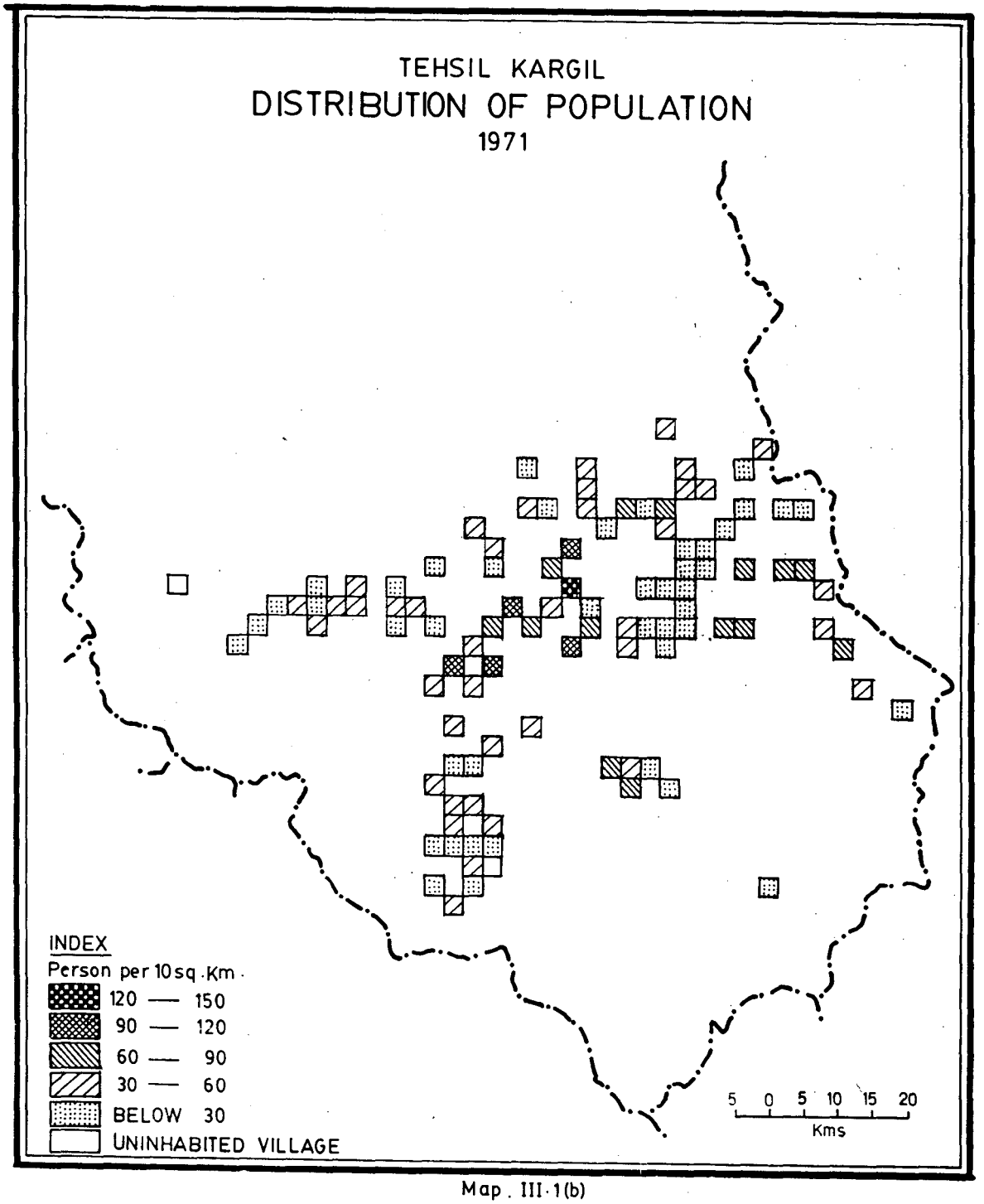
Name of Block	Population[14]		
	1961	1971	1981
Dras	4760	5440	6544
Kargil	9735	11404	14338
Shakarchiktan	3593	5193	6775
Shergol	4442	5191	6404
Sankoo	10172	12213	14586
Tesuru	3798	4683	5501

Source: District Census Handbook 1961, 1971 Ladakh District and 1981 Kargil District.

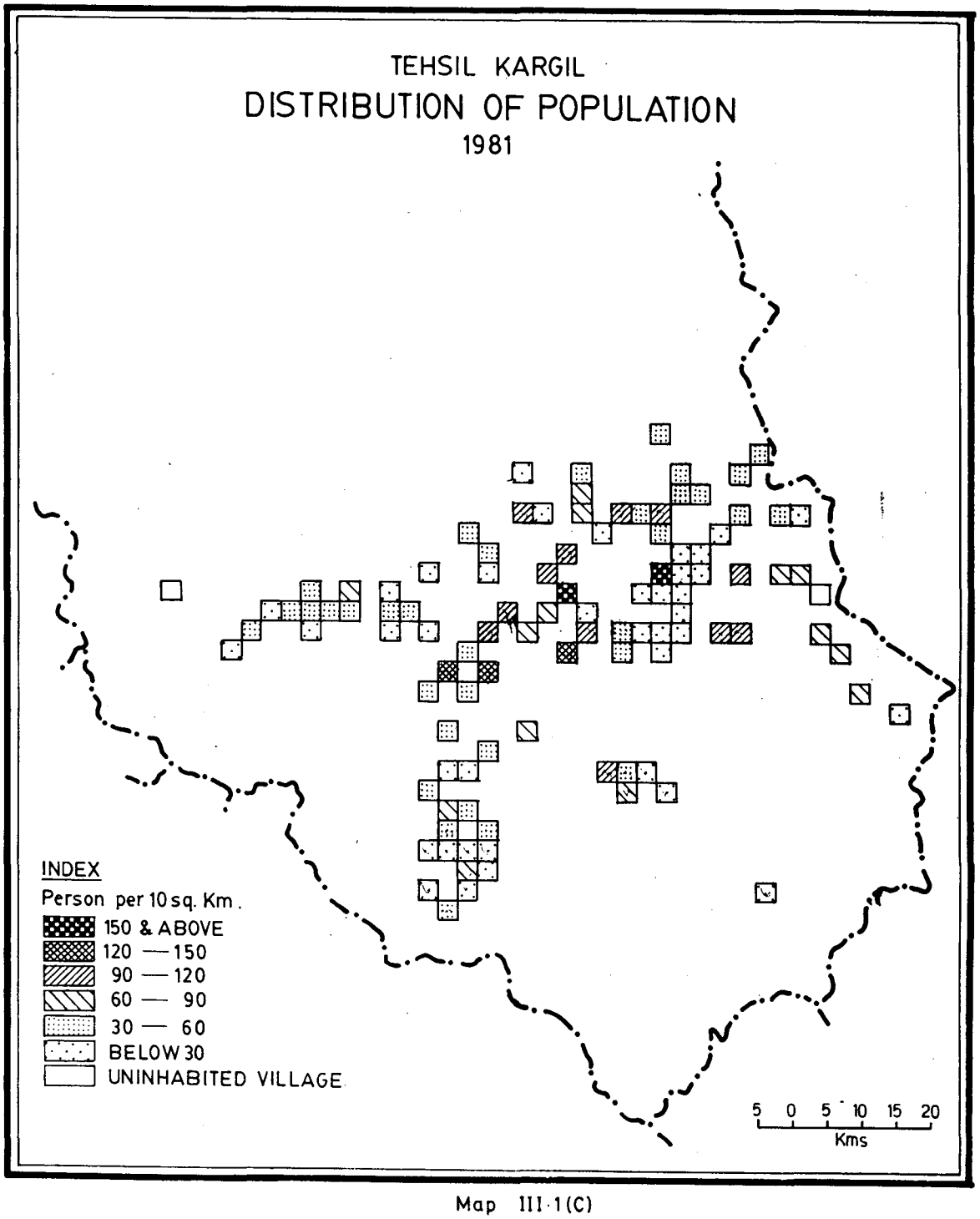
14. Kargil tehsil is divided into six developmental blocks and the list of villages falling in each block was obtained from office of District Block Developmental Officer Kargil. The population of villages was added to get block totals. Appendix 3.1 gives the list of villages in these blocks.


TEHSIL KARGIL
DISTRIBUTION OF POPULATION
1961
INDEX
Person per 10 sq Km
90 — 120
60 — 90
30 — 60
BELOW 30
N DATA NOT AVAILABLE
UNINHABITED VILLAGE
5 0 5 10 15 20
Kms.

Map · III·1(a)


TEHSIL KARGIL
DISTRIBUTION OF POPULATION
1971
INDEX
Person per 10 sq. Km.
120 — 150
90 — 120
60 — 90
30 — 60
BELOW 30
UNINHABITED VILLAGE
5 0 5 10 15 20
Kms

Map. III·1(b)


TEHSIL KARGIL
DISTRIBUTION OF POPULATION
1981
INDEX
Person per 10 sq. Km.
150 & ABOVE
120 — 150
90 — 120
60 — 90
30 — 60
BELOW 30
UNINHABITED VILLAGE
5 0 5 10 15 20
Kms

Map III·1(C)

Though Tesuru falls in the Suru valley but occupies its upper part, where terrain is more rugged. Similarly Dras block which mainly comes in Dras valley, Shakarchiktan block which falls in Indus valley and Shergol block which is in Wakha valley, have less population, owing to the inhospitable environment and more rugged terrain and narrow width and length of these river valleys than Suru valley.

The population density of Kargil tehsil comes to be around 7 persons per sq.km., slightly higher than that of the district as a whole which has a density of 5 persons per sq.km. The population density maps[15] no.(III.1.a, III.1.b and III.1.c) clearly reveal high concentration of population only in few areas at all the three points of time. The maps show that the highest concentration of population was in Suru valley and lowest in Dras and Indus valley whereas large

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15. The population distribution maps presented have been prepared by superimposing the 10 sq.km. grids over the initial dot maps, for all three points of time, and grids were then accordingly categorised into different density groups.

tracts remained uninhabited. The density of population in all valleys has increased over the years. In Dras valley, the highest density recorded ranged between 3-6 persons per sq.km. in 1961. It increased to 6-9 persons in 1981. The highest population density in Suru valley in 1961 was between 9-12 persons per sq.km. which went upto more than 15 persons per sq.km. in 1981. Similarly the changes have occurred in population density in Wakha and Indus valleys. Important notable feature is that uninhabitated areas in Kargil continue to be so that means uninhabitated areas have not expanded in areal extent. The following can be concluded from the analysis;

i. The population distribution is very uneven owing to the environmental compulsions and only 1.79 per cent of total geographical area of tehsil in inhabitated.

ii. The population is concentrated in different river valleys and Suru valley accommodates 65 per cent of total population owing to the comparatively better environmental conditions. The density of population is highest in Suru valley and lowest in Indus valley.

iii. The density of population in Kargil tehsil is slightly higher than that for the district and

it is highest in the Suru valley. The population has concentrated in this valley which accommodates 47 per cent of settlements of tehsil and hence the 65 per cent of population, which explains higher density of population therein.

iv. The low density of population was observed in Indus and Dras valleys. Both these valleys as brought out in earlier chapter, have poor soils, less fertile land available for cultivation and are narrower and thus have attracted lesser population and settlements in their environments. And hence they sustain a sparse population and therefore a low density of population.

Growth of Population:

The growth of population in a region is affected by births and inmigration or deaths and out-migration. The growth of population whether positive or negative, reflects the history of man's response to the environmental possibilities present in the region.[16] Analysis of

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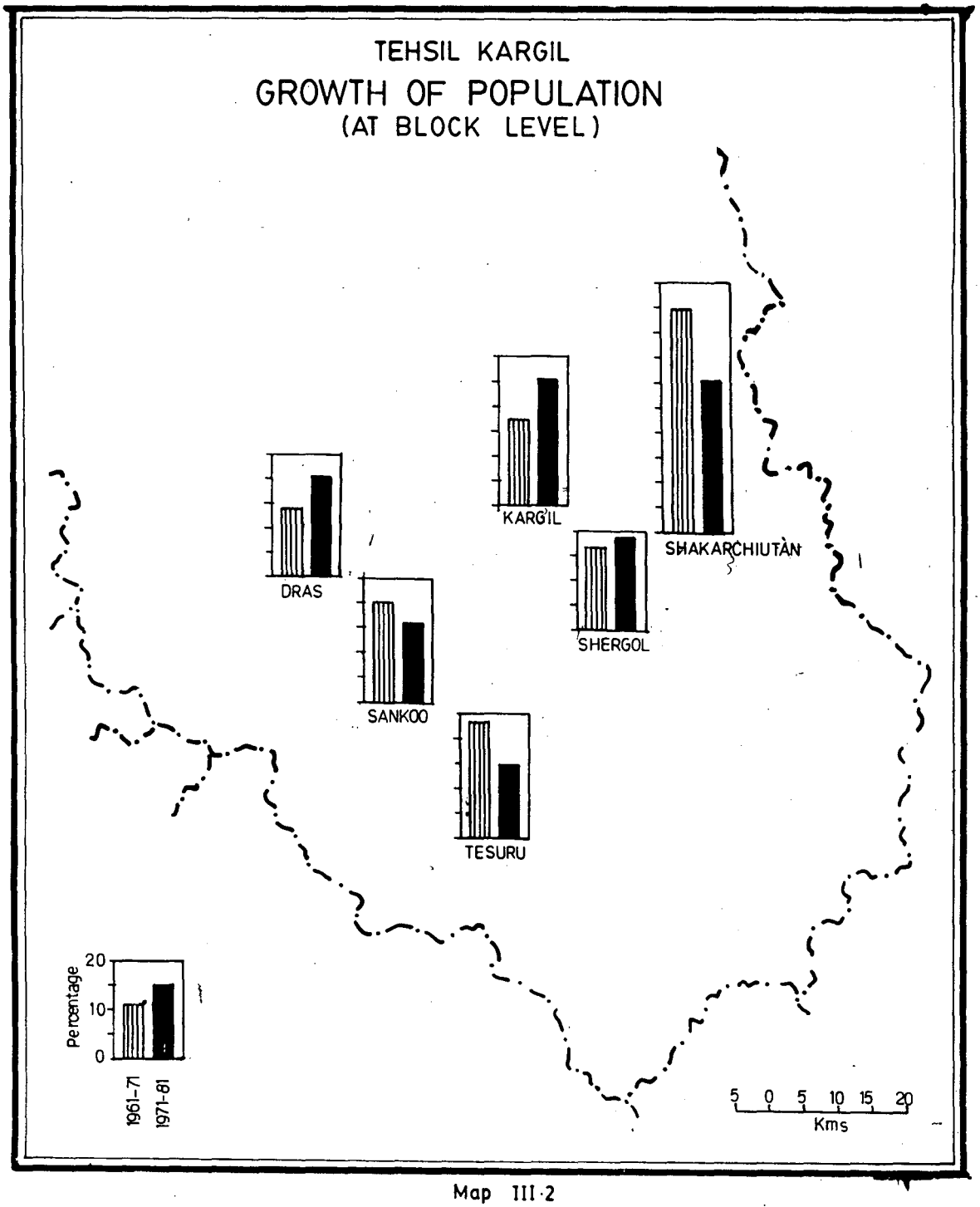
16. P.R. Sharma, "Spatio-temporal patterns of population growth and distribution: A regional analysis" The Decan Geographer, Vol. XVI, No. 1, 1978, p.372.


TEHSIL KARGIL
GROWTH OF POPULATION
(AT BLOCK LEVEL)
DRAS
SANKOO
KARGIL
TESURU
SHERGOL
SHAKARCHIUTAN
Percentage
20
10
0
1961-71
1971-81
5 0 5 10 15 20
Kms

Map III·2

population change is of great significance in a region like Kargil where nature is hostile and man is mainly at the receiving end in the process of man-nature interaction. The size of population and change therein is largely determined by the carrying capacity of land.[17]

Table III.3 depicts the decennial growth rate of population from 1901 to 1981 for Jammu and Kashmir state and Ladakh region as a whole and for Kargil tehsil. The table clearly shows that population grwoth rate in Ladakh region has been much lower than that in the state. Population grew more rapidly in Kargil tehsil than that in Ladakh region[18] as a whole both during 1961-71 and 1971-81. Growth rate of population in Ladakh region was less than 8.3 per cent upto 1951-61 except during 1901-11 when it was 12.45 per cent. But during the last two decades the population has grown rapidly both in Ladakh as well as in Kargil tehsil. It is due to the widening of territorial linkages and improvement in

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17. H.Singh, Ladakh - Problems of Regional Development in the context of growth point strategy, unpublished Ph.D thesis, J.N.U., 1978, p.95.

18. Ladakh region is made up of two districts i.e. Leh and Kargil, and before 1979 it was single district.

socio-economic conditions especially in Leh and Kargil towns which checked outmigration on one hand and led to inmigration on the other.

Table III.3 Decadal Growth of Population(%)

Year	J&K State	Ladakh Region	Kargil Tehsil
1901-11	7.16	12.45	-
1911-21	5.75	1.31	-
1921-31	10.14	4.78	-
1931-41	10.36	5.33	-
1941-51	10.42	8.31	-
1951-61	9.44	7.66	-
1961-71	29.65	18.50	20.88
1971-81	29.69	23.58	23.99

Source: Statistical Hand Book Kargil District 1981-82.

A clearer picture about the growth rate of population for the Kargil tehsil emerges by studying the variations at block and village levels.[19]

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19. Appendix III-2 shows the village level variations in population growth for 1961-71 and 1971-81.

Table III.4 Growth of Population

Name of Block	Growth rate (%)	
	1961-71	1971-81
Dras	14.28	20.29
Kargil	17.14	25.72
Shakarchiktan	44.53	30.46
Shergol	16.86	18.94
Sankoo	20.06	16.26
Tesuru	23.30	14.87

Source: D.C.H., 1961, 1971 , Ladakh District, 1981 Kargil District.

As revealed by Table III.4 , highest growth rate of 30.46 per cent is recorded in Shakarchiktan block during 1971-81 and lowest i.e. 14.87 per cent in Tesuru. The possible factors explaining high growth rate in Shakarchiktan are less outmigration and more medical facilities as a number of Army settlements are found in this block.[20] It may also be pointed out that army

20. It is interesting to note that Shakarchiktan which has highest growth rate and Tesuru with the lowest have relatively higher and lowest sex ratio respectively. Thus male selective inmigration in the case of former and that of outmigration in the case of latter cannot explain these differences. The author proposes to study these factors at more minute and detailed level in his Ph.D dissertation to find out causes of these.

is playing very important positive role by providing army facilities and also offering job opportunities to civilian population. Shakarchiktan is the border block of Kargil. Shakarchiktan experienced a growth rate of over 44.53 per cent during 1961-71. Bock Dras, , Kargil and Shergol showed an increase in growth rate in 1971-81 while Sankoo, Tesuru and Shakarchiktan showed a decline in growth rate in the two decades. The probable causes for the increase of growth rate in Dras, Kargil and Shergol blocks is perhaps the inmigration of males to these blocks in the search of better job opportunities. All these blocks are situated in comparatively better areas nearer to the Kargil town and the induction of socio-economic facilities such as new schools, dispensaries, cooperative stores, banks etc. in Kargil town and in these blocks seems to have induced inmigration. These are also the areas where road construction started in a big way in recent years. Moreover, tourism developed considerably in Ladakh after 1974. This accelerated a number of socio-economic changes on one hand and created new job opportunities for the local inhabitants. This probably led to outmigration of workers from the blocks of Tesuru and Sankoo towards Kargil, Dras and Shakarchiktan. [21]

21. As pointed out earlier, this factor is not fully born out by analysis of sex ratio, thus, it requires more indepth study at a later stage. Other possible reasons could be high female mortality as these blocks lack medical facilities.

This explains low growth rate of population in the former and that of high rate in the latter. Road and building construction and Tourist industry were the main factors which attracted male workers. It may however be pointed out that in the case of Shakarchiktan block again the overall growth rate came down during the last two decades but inspite of that it had highest growths at both points of time. It is understandable that more change came about during 1961-71 in this border block where sizable army moved in around 1965 at the time of Indo -Pak war and number of new roads were built subsequently.

The village wise growth rates of population during 1961-71 and 1971-81 present a different picture. Three villages Darchiks, Kaksar and Hinaku showed negative growth rate of -2.38 per cent, -12.46 per cent and -0.57 per cent respectively during 1961-71. Kaksar continued to show the negative growth rate of -9.59 per cent even during 1971-81 but the situation changed for the other two villages where growth rate became positive. The negative growth rate experienced in Kaksar in both the decades and in Darchiks and Hinaku

in 1961-71 is explained by the fact that all these villages are situated in remote areas with weak economic base suffering traditionally from outmigration. Moreover, these villages have no medical facilities. The positive growth rate experienced in Derchiks and Hinaku can be attributed to the agricultural developments, and the recent road construction which appears to have checked outmigration. Army settlements have come up near both these villages and now the villages are served by the Army doctors which may have reduced the death rates.

The number of villages experiencing negative growth rate doubled during 1971-81. The villages showing negative growth rate during 1971-81 included Kakasar(-9.59 per cent), Mushku(-11.14 per cent) Chulichan(-12.96 per cent), Batambis(-5.15 per cent) Ichu(-11.32 per cent) and Tesuru (-13.71 per cent). All these villages are situated in the interior of the valleys and are relatively inaccessible and remain more or less isolated from where probably outmigration accelerated to more developed pockets. The growth rate was positive for the rest of the villages in both the decades.

15 villages,as shown in Appendix III.2, accounting for 14.7 per cent of total inhabitated villages experienced high growth rate i.e. 30 per cent and above during 1961-71.

45 villages (44.16 per cent) recorded medium growth rate of 15-30 per cent while 39 villages(38.23 per cent) recorded a low growth rate of 0-15 per cent.

The number of villages experiencing high growth rate increased to 23 during 1971-81 which accounted for 22.54 per cent of total inhabitated villages. Medium growth rate was observed in 47 villages, and only 25.49 per cent of inhabitated villages showed a low growth rate.

Majority of villages showing high growth rate are either concentrated in and around the urban centre of Kargil e.g. Shilikche, Poen, Partapganj, Apati, Yourbaltak, Choskor or near the Army settlements e.g. Matayan and Bimbat in Dras valley, Karpokhar and Gyaling in upper Suru valley and Bodh Kharbu and Yogmakharbu in Kanji valley and Sanjak in the Indus valley. The high growth in these villages can be largely explained by inmigration. This argument is supported by the fact that in most of these villages sex ratio declined suggesting male specific inmigration. It appears that male workers migrate to these settlements due to construction work going on near the army settlements and due to other newly developed activities and facilities in and around Kargil town.

The division of Ladakh into two districts in 1979, i.e. Leh and Kargil is the other reason why settlements in and around Kargil , the district headquarter and Shakarchiktan, Shergol and Sankoo the block headquarters, show a high growth rate. The division of the districts led to setting up new administrative offices in Kargil and in the block headquarters. To man these newly set up offices many officials moved to these places. Similarly tourism has resulted in expansion of the Kargil town market. Many persons, local as well as from surrounding region of Kashmir valley have set up their shops, resturants and hotels etc. in and around Kargil town in order to cash on the tourist inflow. Most of these enterpreneur have come to the region after 1974, and it is during 1971-81 that rapid growth rate has been recorded.

Therefore, it is clear from the analysis that number of villages showing high and medium growth has increased in the tehsil and those having low growth rate decreased. Thus the analysis brings out that population has grown rapidly during the last decade due to abovementioned reasons. Apart from this economy is getting diversified as large cultivated areas are

now being devoted to vegetable farming due to demand generated by the Tourists and the army and new education is providing better job possibilities and has made people much more aware. Many new handicrafts and household industrial centres have also been set up. These developmental processes as stated earlier got accelerated in post 1974 period. The low growth of population as revealed by the analysis can be attributed to male selective outmigration from such villages in search of better means of livelihood both within the district as well as outside.

Sex Ratio:

Sex ratio reflects socio-economic conditions prevailing in an area and is useful tool for regional analysis.[22] In a primitive society marked by poor economic conditions , other things remaining the same, a higher proportion of females to males generally denotes male selective outmigration. In order to understand the socio-economic characteristics of

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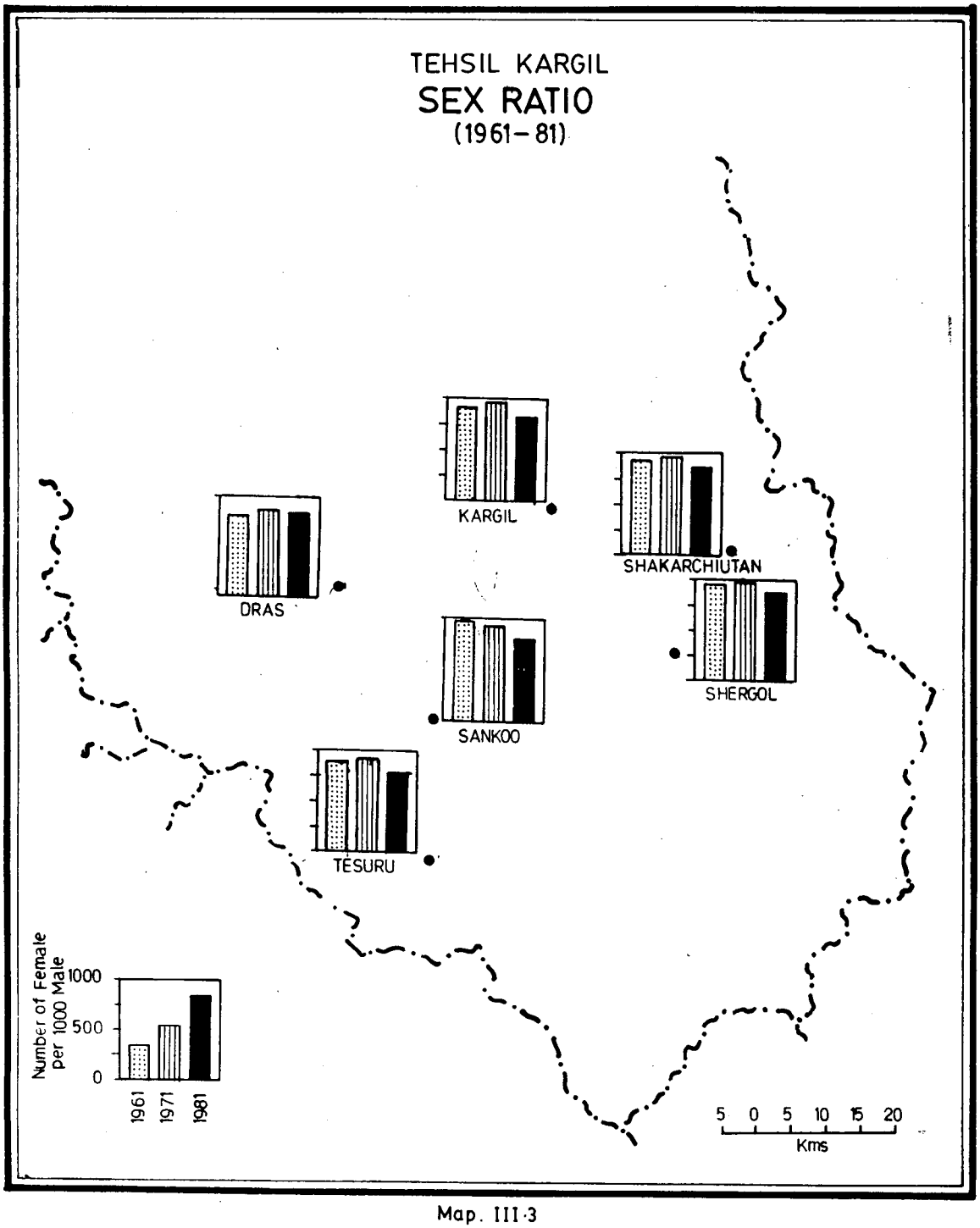
22. S.H. Franklin "The Pattern of Sex Ratio - New England." Economic Geography, Vol. 82, 1956, p.168.


TEHSIL KARGIL
SEX RATIO
(1961-81)
KARGIL
DRAS
SHAKARCHIUTAN
SHERGOL
SANKOO
TESURU
Number of Female per 1000 Male
1000
500
0
1961
1971
1981
5 0 5 10 15 20
Kms

Map. III·3

settlements, the analysis of sex ratio has been attempted at block and village levels. Table III.5 and map III.3 show that sex ratio at all three points of time in Kargil has been low. Main reasons for this could be high female mortality occurring at the time of delivery of child because medical facilities are not adequately available. Moreover very high female illiteracy also contribute towards lack of awareness. Only block Sankoo showed a sex ratio of 1000 females per 1000 males in 1961. Highest sex ratio that 999 females 0/00 males and 881 females 0/00 males were recorded in Shergol block in 1971 and 1981 respectively.

Table III.5 Sex Ratio at Block Level

Name of Block	Sex Ratio		
	1961	1971	1981
Dras	823	896	856
Kargil	905	964	844
Shakarchiktan	921	947	863
Shergol	946	999	881
Sankoo	1000	959	834
Tesuru	901	917	787

Source D.C.H., 1961, 1971 of Ladakh District and 1981 Kargil District.

As revealed by the Table III.5 the lowest sex ratio i.e. 823 and 896 females 0/00 males in 1961 and 1971 respectively was seen in the Dras block, while in 1981 block Tesuru with a sex ratio of 787 females 0/00 males took this position. From the spatio-temporal analysis of sex ratio at the block level the following can be derived:

i. Border block Dras in 1961 and 1971 and remote block of Tesuru in 1981 showed a low sex ratio. It has been observed that lot of construction work started in these areas leading to inmigration of male workers. In border areas.some services are being provided to the army by the civilians which also contribute towards male inmigration.

ii. Shergol and Shakarchiktan showed relatively high sex ratio in both 1971 and 1981. This again can be explained by male outmigration from these backward blocks.

iii. An important observation that can be made from the table is that in all blocks sex ratio significantly came down during 1971-81. This is expected because during this decade lot of new developmental projects

were started. Apart from this a number of economic changes were witnessed in the last 15 years leading to settling of new offices and other institutions. These checked male specific outmigration on one hand and attracted a number of male workers to man these projects, offices and other institutes. It has been observed even the government employees who are posted here, they complete their tenure staying alone in the region leaving their families behind in Kashmir valley or in Jammu province.[23] Low sex ratio in Tesuru, Sankoo and Kargil in 1981 is mainly because of the above mentioned factors.

A more detailed analysis of sex ratio was attempted at village level.[24] No village had a exceptional high sex ratio in 1961. While 34 villages revealed a high sex ratio of 1000-1200 females per thousand males, 19 of these villages are situated in Suru valley, 3 villages i.e. Garkon, Hardas and Shakar are in Indus valley and the rest are distributed

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23. It is likely that there are significant differences in the birth rates of male and female babies. In order to find out this aspect a separate indepth study is required.

24. Appendix III.3 shows the sex ratio of villages at three points of time.

in Dras and Wakha valleys. 50 villages accounting for 48.54 per cent of the total inhabitated villages showed sex ratio ranging between 800-1000 female per thousand males. Such villages are distributed in all the geographical units of tehsil. 19 villages which make up 18.53 per cent of total villages had a sex ratio of less than 800 females 0/00 males. Majority of these villages are situated near Kargil town e.g. Hardas, Kaksar, Partapganj, Baroo etc. Thus urban "Pull" factor appears to have induced inmigration not only in Kargil but also to these adjacent settlements, as most of the employment opportunities and construction works upto 1960's were available in and around Kargil.

The pattern showed a change in 1971. Two villages Nunamche and Tingdo showed a very high sex ratio of more than 1200 female 0/00 males. Both these villages are situated in Wakha valley. The number of villages showing sex ratio in range of 1000-1200 females 0/00 males were 26. Most of these villages are situated in the interior of the river valley of tehsil. Villages like Thrangas, Chokial, Mushku , Garkon, Chulichan, Gyaling and Pranti are situated in the relatively

isolated parts. Sex ratio was less than 800 females 0/00 males in nine villages in 1971. Again the majority of these villages are situated near the Kargil town e.g. Karkit, Partapganj, Hardas and male selective inmigration to these areas emerges as the probable reason.

A notable feature is that number of villages showing sex ratio of less than 1000 females 0/00 males has decreased over the years. In 1961 such villages were 34, their number came down to 26 in 1971, then to 12 in 1981. It can be inferred that over the years male selective outmigration has decreased on one hand and their inmigration increased on the other.[25]

Literacy:

Literacy a qualitative aspect of the population is the measure of level of awareness. It has been rightly said that for "any type of the social change in a society a high level of literacy and higher standards of educational attainment are absolutely essential"[26]. Education is believed to bring a change

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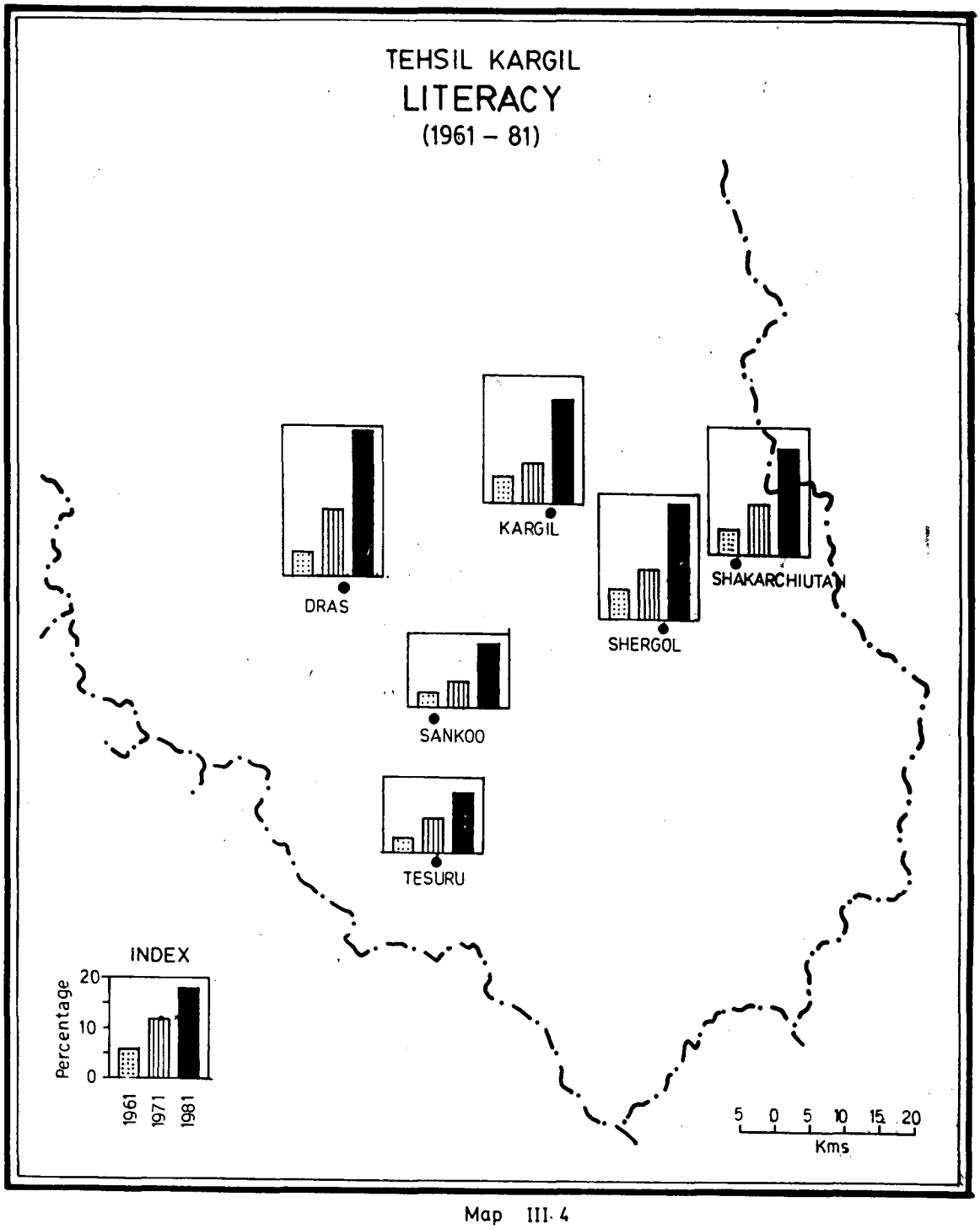
25. There can be several other bio-social factors for such pattern. To know the real causes, as stated earlier, a separate indepth demographic study is proposed at a later stage.

26. M.K. Premi, A. Ramanamma and U. Bambavale, An Introduction to Social Demography, Vikas Publishing House, Delhi, 1983, p.42.


TEHSIL KARGIL
LITERACY
(1961 – 81)
DRAS
KARGIL
SHERGOL
SHAKARCHIUTAN
SANKOO
TESURU
INDEX
Percentage
20
10
0
1961
1971
1981
5 0 5 10 15 20
Kms

Map III. 4

in out look and improves the efficiency of workers. Thus, literacy level of population has been analysed at the block and the village levels.[27]

The Table III.6 and map III.4 make it quite clear that block Dras had higher proportion of literates both in 1971 and 1981. This could be attributed to the fact that more than 90 per cent villages in 1971 and 100 per cent in 1981 in this block had educational institutions.

Block Sankoo had lowest percentage of literates to total population in 1961 and 1971 but its position changed slightly in 1981 and Tesuru recorded lowest proportion of literates.

The data female literacy presents even a more gloomy picture. The highest proportion of literate females was 0.23 per cent in 1961 in Shergol block. Block Sankoo showed highest female literacy with 1.73 per cent literate females.to total females in 1971. In 1981, data presents a slightly better

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27. Appendix III.4 gives the village level data of literacy.

Table III.6 Variation in Lieracy at Block Level

Name of block	Number of literates and percentage to total population					
	1961		1971		1981	
	Total %age	Female %age	Total %age	Female %age	Total %age	Female %age
	(fig.in brackets are percentages)					
Dras	224(4.70)	2(0.001)	729(13.48)	27(1.04)	1873(28.26)	138(4.56)
Kargil	604(5.29)	12(0.02)	876(7.68)	41(0.69)	2875(20.07)	403(6.82)
Shakarchiktan	164(4.56)	1(.05)	513(9.89)	34(1.33)	1451(21.41)	99(3.15)
Shergol	270(6.07)	5(0.23)	528(10.17)	27(1.41)	1485(22.72)	149(5.29)
Sankoo	293(2.88)	3(0.05)	646(5.28)	16(1.73)	1872(12.83)	51(0.89)
Tesuru	115(3.02)	1(0.04)	305(6.51)	5(0.22)	916(12.01)	50(2.06)

Source: Computed from D.C.H. Ladakh 1961,1971 and Kargil, 1981(By Researcher).

picture. Highest female literacy was found in Kargil block with 6.82 per cent of literate females. The lowest female literacy i.e. 0.89 per cent was recorded in Sankoo block.

To know the exact position of literacy level, village wise picture was seen. The data reveals that 86 villages in 1961 had low literacy with less than 10 per cent literate population. The number decreased to 73 villages in 1971 and to 18 in 1981. As there was a decline in low literacy villages, there has been corresponding increase in the number of villages having medium and high literacy. Only 12 villages showed a literacy in the range of 10-20 per cent in 1961 and the number rose to 42 villages in 1981. 31 villages had literacy in the range of 20-30 in 1981 compared to 3 in 1961. Only village Karit had a literacy of more than 30 per cent in 1961 but the number of villages showing the same in 1981 became 11. The changes are occurring due to the growing awareness and to the fact that 98% of the settlements in the tehsil now have at least one school. Like the blocks , the number of literates is on increase in the villages also.

The following explaination can be given for the improving literacy of the population. Inmigra

Inmigration of government employees and traders to the region from the Kashmir valley during 1961-81 appears to have raised literacy level over the years. The Jammu & Kashmir government has introduced special incentives to the employees posted in Ladakh region. In order to solve the unemployment problem among educated youths in Kashmir valley and Jammu region and to meet the socio-economic requirements of the people of Ladakh, a number of schools, dispensaries, Medical Health Centres etc were established during 1971-81 in the region. Many of these institutions are managed with outside staff.

Kargil acquired the district status in 1979 before that it was a part of district Ladakh. This led to number of government offices being set up in Kargil town and in block headquarters. That led to greater inmigration of educated employees after 1979 and it explains sudden rise in levels of literacy in block headquarters and villages surrounding the urban area in 1981. A number of high middle and primary

schools were established in the region after 1979 in these headquarters and they appear to be responsible for growing literacy.

To conclude , it can be said that though literacy has shown an improvement over the decades both in villages and in block headquarters but the rate is very slow.

Economic Characteristics

The demographic characteristics of settlements are closely related to and reflect the economic changes taking place therein. It is, therefore, important to analyse the economic structure of the region.

In the under developed mountainous region of Kargil agriculture and live stock rearing are the major economic responses of man to hostile environment. Land and water resources thus acquire a significant importance in the type of resources available. So, it is relevant to discuss here land use pattern of the region as it reflects the type and "extent of the environmental adaptation".[28]

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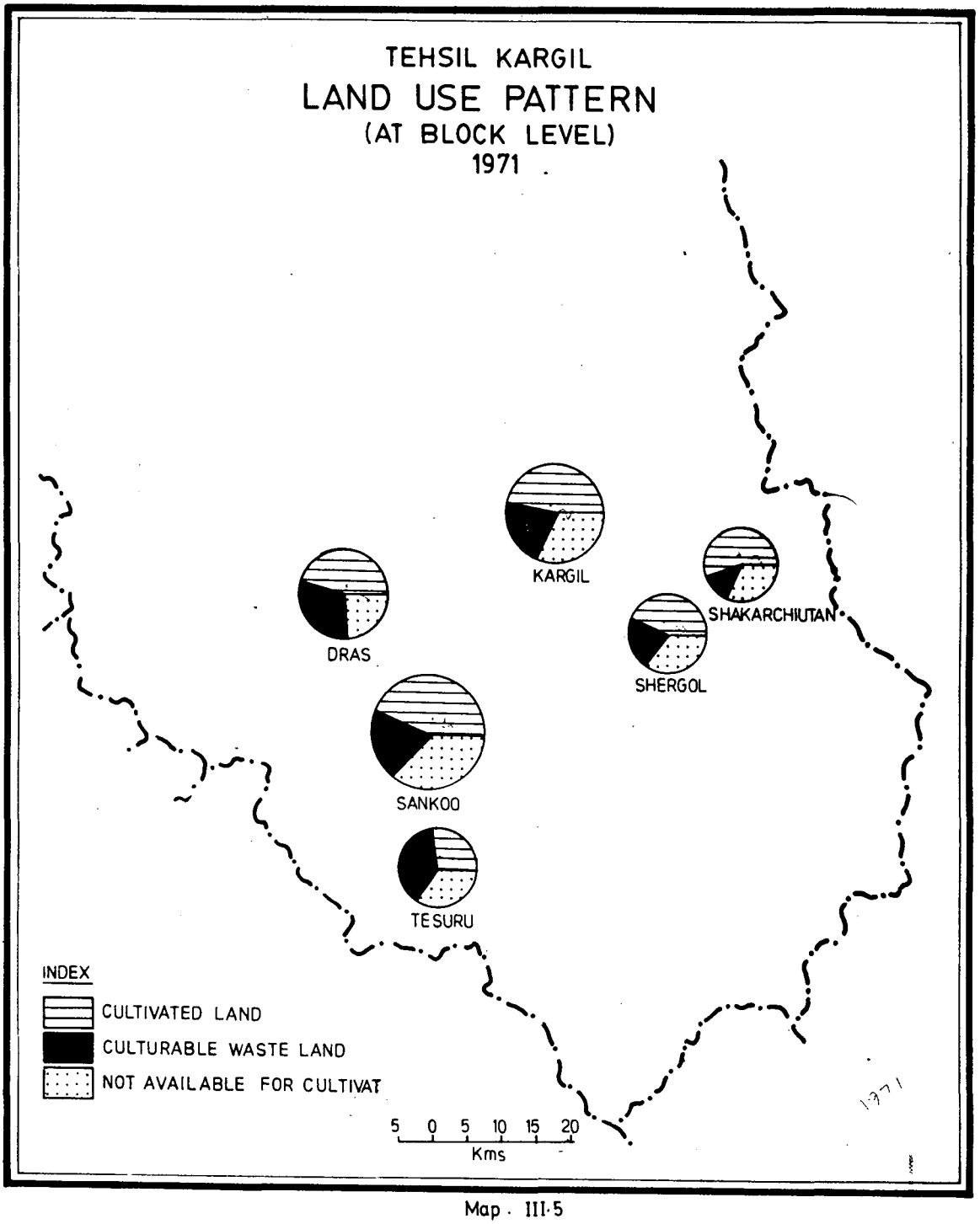
28. S. Gokhale, "Man-environment interaction and problems of socio-economic development in Zanskar(Ladakh), unpublished Ph.D. thesis, J.N.U., 1986, p.260.

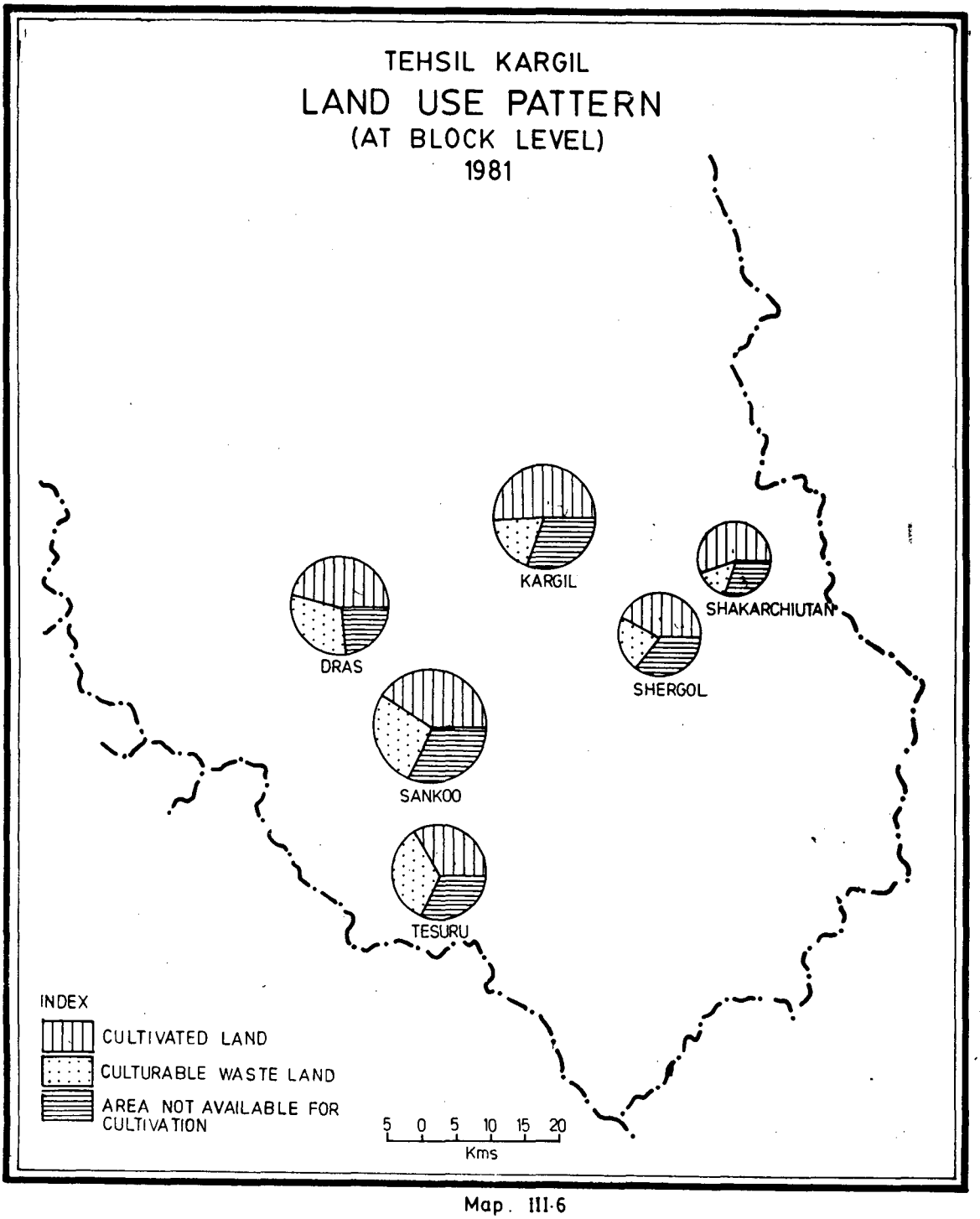
Land Use Pattern:

As pointed out earlier, large part of Kargil tehsil is uninhabitated and villages cover only 146.21 sq.km area which accounts for 1.76 per cent of the total geographical area.

The land use pattern as reflected in Table III.7 shows that 6373.86 hectares of land accounting for 45.27 per cent of total village area, was under cultivation in 1971. The area under cultivation increased to 6674.07 hectares i.e. 45.67 per cent of total village area in 1981. Thus, during the decade an additional 300 hectares of land have been brought under plough. Comparison of 1971 and 1981 land use data reveals that area under culturable waste in the region increased from 3321.26 hectares in 1971 to 3527.9 hectares in 1981. This is due to increase in the assessed village area that means new land has been incorporated into villages. Nevertheless it is this land which has been brought under cultivation with help of the modern agricultural equipments and irrigational facilities. The table shows increase in all types of land during 1971-81. The category of


TEHSIL KARGIL
LAND USE PATTERN
(AT BLOCK LEVEL)
1971
KARGIL
DRAS
SHERGOL
SHAKARCHIUTAN
SANKOO
TESURU
INDEX
CULTIVATED LAND
CULTURABLE WASTE LAND
NOT AVAILABLE FOR CULTIVAT
5 0 5 10 15 20
Kms

Map . III·5


TEHSIL KARGIL
LAND USE PATTERN
(AT BLOCK LEVEL)
1981
KARGIL
SHAKARCHIUTAN
DRAS
SHERGOL
SANKOO
TESURU
INDEX
CULTIVATED LAND
CULTURABLE WASTE LAND
AREA NOT AVAILABLE FOR CULTIVATION
5 0 5 10 15 20
Kms

Map. III-6

culturable waste in Kargil generally consists of land which needs levelling or lies far from the irrigation net work. Therefore, this land has agricultural potential and can be put under plough at a later stage.

TABLE III.7 Land Use Pattern(in Hectares)

Year	Land Use			
	Assessed Area	Cultivated land	Culturable waste	Area not available for cultivation
1971	14078.68	6373.86	3321.26	4383.56
1981	14611.25	6674.07	3527.90	4409.08

Source: D.C.H, 1971 Ladakh District and 1981 Kargil District.

Changes in the land use pattern have been further studied by taking data at block level. Table III.8 and maps(III.5 and III.6) reveal that cultivated land has increased in all blocks between 1971 and 1981.except in Sankoo block where it showed decline. Land categorised as culturable waste shows

Table III.8 Land Use at Block Level(In hectares)

Name of block	Assessed Area		Cultivated land		Waste land		Land not available for cultivation	
	1971	1981	1971	1981	1971	1981	1971	1981
Dras	2243.21	2312.49	1076.76	1084.99	679.67	736.83	486.84	490.07
Kargil	2956.86	3067.07	1448.30	1549.04	531.22	562.24	977.34	955.70
Shakar Chiktan	1416.03	1479.48	760.85	823.28	183.32	183.32	471.86	472.88
Shergol	1704.63	1732.62	773.85	793.13	312.44	319.10	618.34	620.39
Sankoo	3901.63	3993.05	1806.22	1798.85	864.36	967.21	1231.05	1226.99
Tesuru	1856.26	2026.94	507.88	624.78	750.25	759.20	598.13	642.96

Source: Computed from D.C.H. 1971, Ladakh District and 1981 Kargil District.

that in five blocks i.e. Dras, Kargil, Shergol, and Sankoo and Tesuru the percentage culturable waste land has shown an increase during 1971-81. Area not available for cultivation also shows fluctuations between the reference years. All six blocks have shown a decline in the percentage area not available for cultivation when compared with 1971 percentages.

A notable feature about the land use pattern of tehsil is that no land has been categorized as land under forests. This is because there are no natural forests in tehsil and moreover the trees are found in the vicinity of religious places i.e. Gompas in case of Buddhist villages and mosques in the Muslim villages or near the water channels and are being looked as assets.

The land use pattern study shows that it is in the smaller sized blocks where maximum land is being used for cultivation purposes. This is due to the fact that owing to limited available land for cultivation the maximum utilization is being made in smaller blocks. The discussion on land use followed with a examination of the occupational structure of population because the latter reflects the economic characteristics of population.

Occupational Structure:

Occupational structure is the relationship between three occupational components and their relative development i.e. the primary, the secondary and the tertiary sectors.

The population of the tehsil can be divided into two categories working population and non working population. 46.51 per cent of population in 1981 were non workers. Work force represents the total population which is actively engaged in primary, secondary and tertiary sectors and proportion of these workers in these sectors determines the economic structure of the region. Table III.9 shows that 83 per cent of male workers and 95 per cent of female workers in 1971 were cultivators in the region. This shows that the tehsil has a agricultural economy. Decline of the total proportion of cultivators from 87.11 per cent in 1971 to 71.11 per cent in 1981, however reflects the level of diversity in the changing occupational structure. The decline is more marked in the proportion of male cultivators. The high percentage of female cultivators to total female workers in the tehsil shows importance of female workers in agricultural activities of region. The

Table III.9 Perennage of workers to main workers.

Year	Cultivators			Agricultural Labourers			Manufacturing and Repairs and Household Industries			Other Services		
	M	F	T	M	F	T	M	F	T	M	F	T
1971	87.16	95.76	89.90	2.28	2.99	2.52	0.19	0.31	0.21	10.36	0.97	7.36
1981	63.48	97.26	74.06	5.56	0.64	4.02	0.22	0.26	0.23	30.73	1.82	21.67

Source: D.C.H., 1971 Ladakh District and
1981 Kargil District.

variation in occupational structure at block level have been shown in Table III.10 and map III.7. Both show that overwhelming majority of workers is engaged in agriculture in all blocks. Proportion of workers engaged in manufacturing and repairing is quite low. Second category after agriculture is the workers engaged in other services. This sector has expanded drastically in the last two decades. Proportion female cultivators account for more than 93 per cent in all blocks. In the manufacturing and repairing sector and in other services sector the participation of female workers in all blocks is quite low. Compared to female workers engaged in agriculture , the proportion male workers engaged in this sector is low in all blocks. This reflects the low level of economic diversification on one hand and of only males joining non agricultural sectors on the other. The male workers have started joining the secondary and tertiary occupations which are now available in terms of new jobs created in the region due to recent change in economy. The growing social awareness, better job opportunities than earlier days particularly in the block headquarters and urban centre of Kargil, and the limited carrying capacity of

Table III.10 Occupational Structure of Blocks(1981)

Name of block	Cultivators			Agricultural labourers			Manufacturing and repairs			Others		
	M	F	Total	M	F	Total	M	F	Total	M	F	Total
Dras	890	492	1382	1	0	1	3	0	3	800	30	830
%age of total	(52.53)	(94.25)	(62.40)	(0.05)	(0)	(.001)	(.17)	(0)	(.001)	(47.22)	(5.74)	(37.45)
Kargil	2808	2522	5330	278	18	396	7	5	12	1284	37	1321
%age of total	(64.15)	(97.67)	(75.50)	(6.35)	(0.69)	(5.60)	(.15)	(0.19)	(0.16)	(29.33)	(1.43)	(18.71)
Shakarchiktan	1290	638	1928	44	4	48	25	0	25	537	23	560
%age of total	(60.80)	(95.93)	(75.28)	(2.32)	(.60)	(.31)	(.32)	(0)	(.19)	(28.32)	(3.45)	(21.86)
Shergol	887	1456	2343	34	6	40	2	2	4	836	25	865
%age of total	(50.42)	(97.78)	(73.15)	(1.93)	(.40)	(1.24)	(0.11)	(.13)	(.12)	(47.52)	(1.67)	(26.72)
Sankoo	3139	1988	5127	423	19	442	18	11	29	1111	17	1128
%age of total	(66.91)	(97.69)	(76.22)	(9.02)	(.93)	(6.5)	(.38)	(.54)	(.43)	(23.68)	(.83)	(16.78)
Tesuru	1295	101	1396	127	2	129	1	1	2	436	4	440
%age of total	(69.66)	(93.35)	(70.97)	(6.83)	(1.85)	(6.55)	(.05)	(.92)	(.10)	(23.45)	(.37)	(22.36)

Source: Compiled from D.C.H. 1981, Kargil District.

of agricultural land as well as low returns from it, are the reasons why male workers have started joining secondary and tertiary occupations.

Thus, it can be concluded that manpower is limited in the tehsil and problem gets enhanced due to harsh natural constraints and the low carrying capacity of land. The population growth rate was slow before 1971. The growth rate in 1971 and 1981 has been over 20 per cent. The region is having a low sex ratio and suffers from male selective outmigration from backward villages. Villages in and around Kargil town , block headquarters have recorded a low sex ratio mainly due to male selective inmigration to these areas. The region is having majority of its inhabitants as illiterates and literacy level is quite low. Bulk of the workforce is engaged in primary sector and the region is having an agricultural economy. The settlements naturally in such societies tend to cluster in few favourable pockets where environmental constraints are less severe and man here has averted to certain extent the environmental in-hospitality. So, it will be interesting to study settlement structure and its spatial organization in consonance with natural environment. This has been attempted in next chapter.

CHAPTER - IV

SPATIAL ORGANISATION OF SETTLEMENTS

Most visible and stable attribute of human occupance is the settlement which is established basically for dwelling purposes. Since man cannot live without shelter, settlements are part and parcel of the human habitat system. In initial stages of development, settlements are simple but as development proceeds the settlements also become more complex. In a primitive society where man is generally at the receiving end in the man-environment interaction, the spatial organisation of settlements reflects the impact of natural environment on human life and on other related socio-economic activities.

In arid mountain areas location of settlements is determined by the availability of water and of fertile and level land. Settlements are generally situated in the river valleys in such areas.

The mountainous lands having low level of technology generally suffer from lack of amenities with limited communication system. Settlements in such an area emerge as self subsistence units.

Kargil examplifies a rural mountainous region with weak linkages among the settlements. The inhospitable

environment, with settlements confined to a few favourable pockets in river valleys and low level of technology leading to subsistance type of economy, are the main factors responsible for weak linkages. In such an area with weak inter-settlement as well inter-valley linkages, each valley emerges as a micro "world" in itself. Thus settlements in different valleys at times present different cultural landscape. It has also been observed that in these areas, the external and internal characteristics of settlements are greatly influenced by the environmental factors and the local resource base.

There are at present 104 villages and 1 town in Kargil tehsil, out of these two are uninhabitated. The 102 villages and the town supports a population of 57675 persons. Each village generally is made up of number of hamlets which have been grouped together as census village for convenience in enumeration. Moreover, some of these are individually too small in terms of area and population to merit a seperate status. All settlements are situated in areas where water and cultivable land are available to sustain agriculture

which, as stated earlier, is the main occupation of people. The inhabitants follow two religious faiths i.e. Islam and Buddhism. Majority of settlements of Kargil have Muslim population. It has been seen that religion plays an important role in the cultural Landscape of Ladakh. Settlements having Muslim population are generally marked by a mosque or an Imambara situated in the centre of the village. Whereas a Gompa occupies a prominent place on the upper slopes at an elevated area in a Buddhist village.[1]

In order to have an idea of settlement structure of Kargil, five villages were selected for detailed analysis. These included -

i. Pandras

ii. Pushkum

iii. Bodhkhrbu

iv. Garkon

v. Rangdom

The reasons for selecting these settlements are that these are situated in different geographical units of the region, and have distinct socio-cultural personality. Pandras is situated in Dras valley

1. H.Singh, "Territorial Organization of Gompas in Ladakh", Himalaya: Ecologie - Ethnologie, C.N.R.S., Paris, 1977, pp. 351-70.

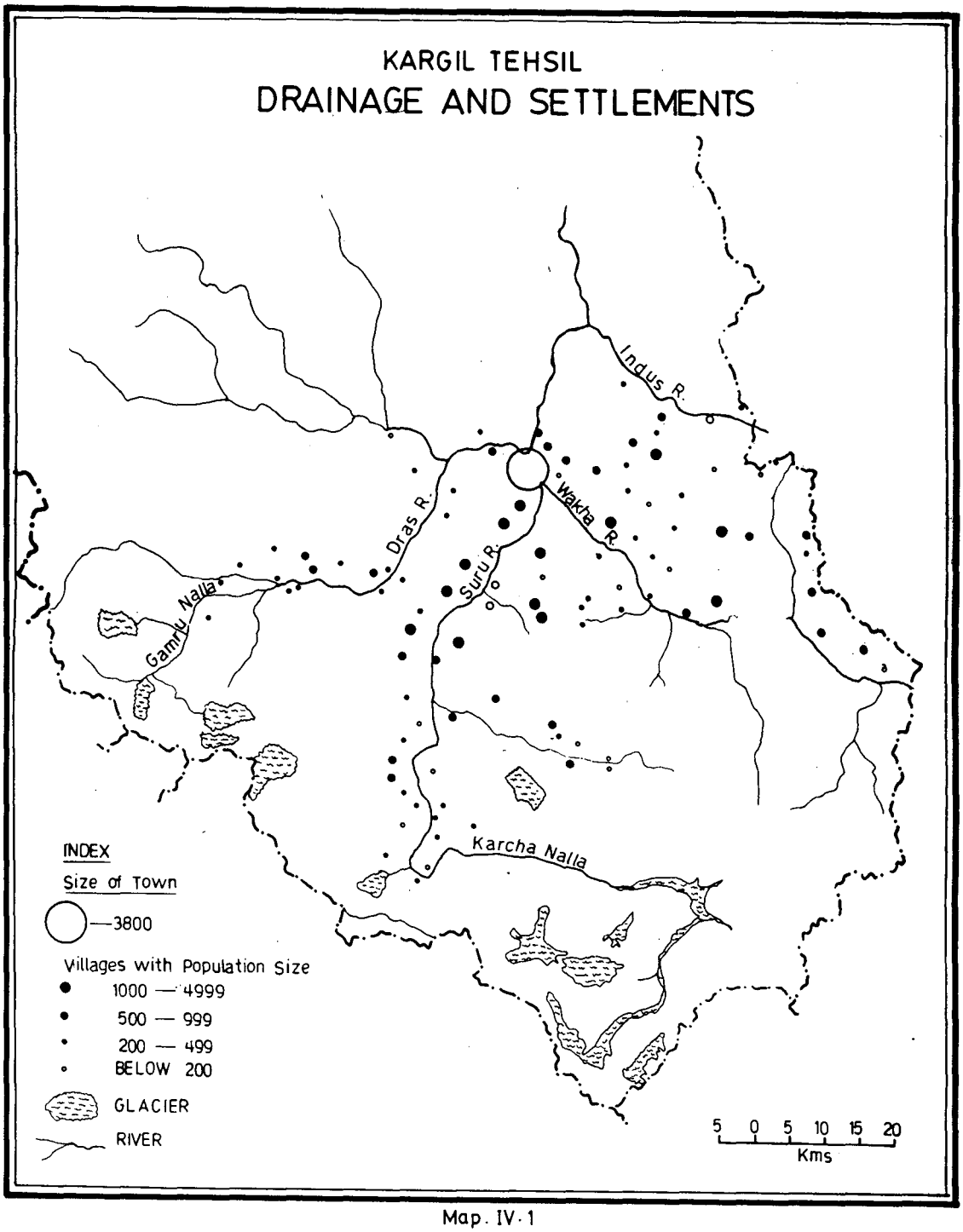
and is inhabitated by Shia and Sunney Muslims. Bodhkhrbu is the last Buddhist settlement of Kargil tehsil situated in Kanji valley in eastern Kargil. Garkon is a Dard Buddhist settlement situated in Indus valley. Rangdom is the last settlement of Kargil tehsil situated in the upper Suru Valley and is basically a Gompa village. Pushkum is a Muslim settlement situated in the central part of Kargil tehsil in the Wakha valley. Due to location of these settlements in different geographical units and with different socio-religious aspects, these have been taken as a representative settlements for the entire region.

Keeping the above in mind an attempt has been made to understand the following aspects of settlements;

i. Pattern of settlement distribution.

ii. Site and situation of settlements, which reflect the environmental constraints.

iii. The morphology and house type which again highlight the environmental compulsions and local resource base.


KARGIL TEHSIL
DRAINAGE AND SETTLEMENTS
Indus R.
Wakha R.
Dras R.
Suru R.
Gamru Nalla
Karcha Nalla
INDEX
Size of Town
—3800
Villages with Population Size
1000 — 4999
500 — 999
200 — 499
BELOW 200
GLACIER
RIVER
5 0 5 10 15 20
Kms

Map. IV·1

Pattern Of Settlement Distribution

The settlement pattern refers to the configuration revealed by the locational arrangement of settlements in an area. Settlement pattern evolves through interaction among people, their culture, history and ecology. In mountain lands the physical factors play a predominant role in distributional pattern of settlements. Settlements in mountain lands are generally found along rivers or near fertile agricultural lands and in general clustering of settlements in a backward area is the result of availability and concentration of natural resources such as water, adequate soil cover and level land. Political and socio-economic aspects that require close ties between the inhabitants, are also responsible for such a pattern in primitive societies. Dispersed settlements in such society are generally the reflection of certain environmental compulsions and self sufficiency of settlements while random pattern is usually found in areas where the resources are ubiquitous.

Map (IV.1) shows that there is a close relationship between drainage lines and settlement

pattern in Kargil. The settlements as stated earlier in Kargil need water and cultivable land for survival because of the arid climate and rocky rugged terrain. Hence settlements are found along the water channels forming linear pattern of distribution. Clustering is generally common near confluence zone which provide more relative flat land and ample supply of water. The settlement distribution pattern was examined by using nearest neighbour analysis(NNA)[2].

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2. The "Rn" value measures the deviation of any spatial pattern of the distribution of points from randomness. The nearest neighbour index "Rn" was calculated by using the following formula:

$$Rn = \frac{D\bar{o}}{D\bar{r}}, \quad D\bar{o} = \frac{D}{N}; \quad D\bar{r} = \frac{1}{2\sqrt{\frac{N}{A}}}$$

Where D = Total actual distance between each pair of points. A=Area, N= Number of settlements. The R value generally ranges from 0 to 2.15. If the R value falls between 0 - 1, the settlements are taken as approaching clustered pattern and if R value falls between 1 -2.15, these show a tendency towards uniform pattern. This method brings out the difference in the actual distance between settlement points and the expected random distance between the same points and the same area. A variation in two values would denote random distribution if the difference between the actual and expected distance is not significant. The statistics

$Z = \frac{D\bar{o} - D\bar{r}}{D\bar{r}}$ is a standard normal variate and is used to see significance between Do and Dr where $Dr = \frac{.26136}{\sqrt{\frac{N}{A}}}$. As explained in A. Mehmood "Statistical Methods in Geograhpical Studies" Rajesh Publications, 2nd ed., 1986, pp. 72-77.

The NNA, however, fails to bring out the difference between a single and a multiculustered pattern. In Kargil settlements are situated on either side of rivers and though physically close to each other but are rarely connected by bridges. The road from one village to another across the river, runs along the river bank upto the nearest bridge and then upto the village on the other side. Thus the physical distance may really be very different from the real distance.

This method though distorted the calculated value of "Rn" but a more realistic picture emerged. The whole tehsil was divided into sub-units consisting of different river valleys. Thus the four units identified were the Dras valley, the Suru valley and the Indus and the Wakha valleys.

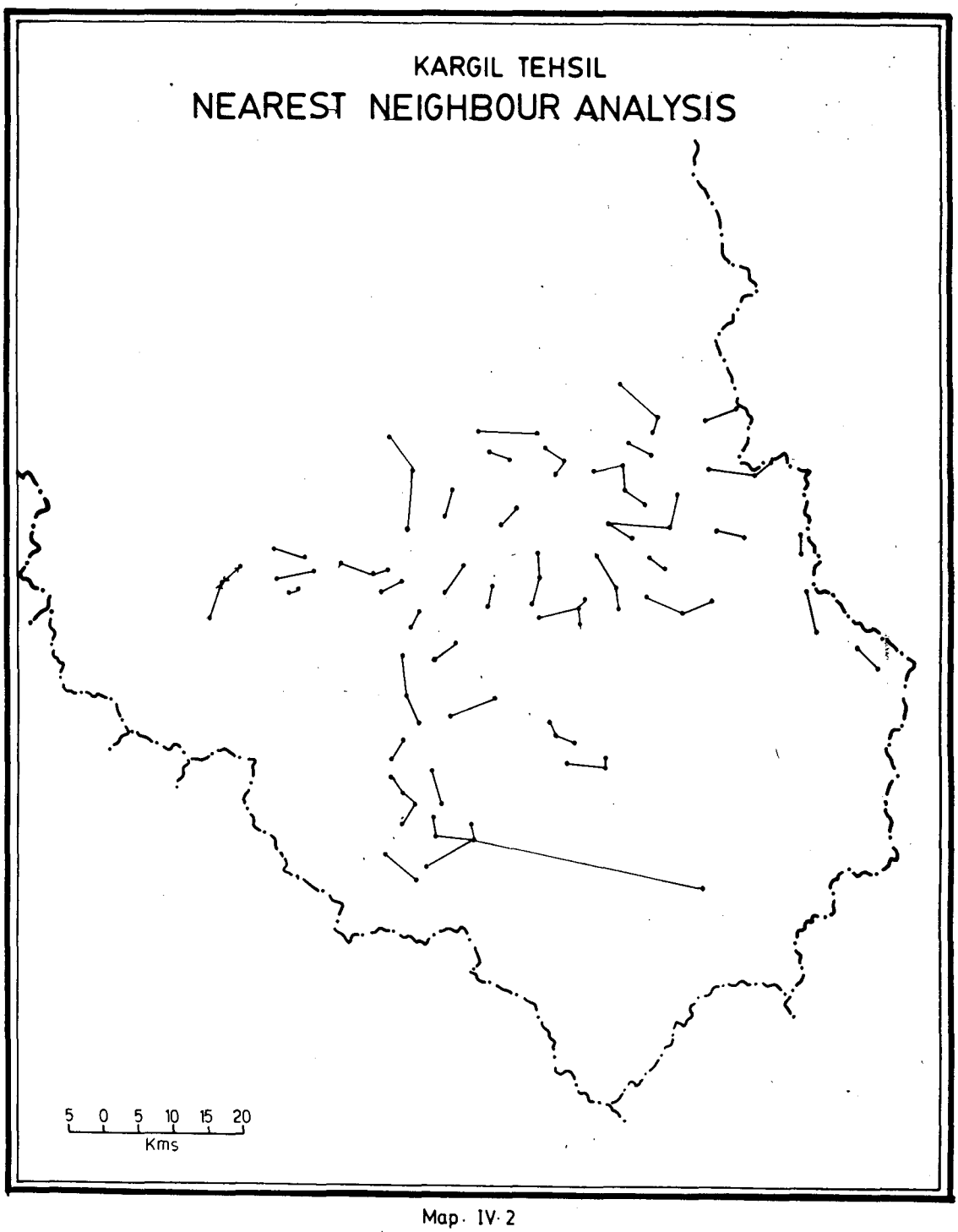
The pattern of settlement distribution in Kargil as revealed by "Rn" values and Z statistics as shown in Table (IV.I) is predominantly uniformally dispersed. The reasons for this phenomenon are that settlements in Kargil do not lie in close

proximity to each other, but are situated throughout the tehsil in clusters of a few, however, only along the the river channels. As stated earlier out of 8282 sq.km. of geographical area of tehsil, only 146.11 sq.km. are assessed village area. And it is this 146.11 sq.km..area where all the rural settlements are distributed over whole of tehsil.

Table IV.I: Nearest Neighbour Analysis

Sub unit	Rn	Z	Significant/ insignificant	Pattern
Dras valley	1.730	5.586	S	Uniform
Suru valley	2.230	4.579	S	Uniform
Wakha valley	2.193	6.839	S	Uniform
Indus valley	1.690	5.282	S	Uniform
Kargil tehsil	1.983	19.267	S	Uniform

Table IV.I shows lowest "Rn" values of 1.690 and 1.730 in the Indus and Dras valleys respectively.



Map. IV. 2

The Suru and Wakha valleys got the highest values. The low values in the Dras and the Indus are due to the large proportion of uninhabitated and only a few settlements therein. The higher values of "Rn" in the Suru and the Wakha can be attributed to the dispersion of settlements uniformally over the entire area. As is clear from the table that all valleys have uniform pattern of settlement distribution. The level of uniformity however varies with those in the Indus and the Dras being closer to clustering and in the Suru and the Wakha more well spread. The "Z" values as revealed by the Table in all the valleys is more than the "Rn" values and thus are "significant" at 1 per cent level of significance for all the units.

Site And Situation

The factors determining the site and situation of settlements in Kargil are both physical and economic. Due to mountainous terrain, limited agricultural land scarcity of water and soil resources, settlements are restricted to river valleys. As stated earlier, the main occupation of dwellers is

cultivation and hence all the settlements are found near the water sources. For any settlement to survive in this inhospitable cold desert, water for irrigation relatively flat land which could be adequate soil cover to sustain plant cover and lower altitude where temperature is relatively high to permit germination of seeds and growth of plants are basic essentials. These preconditions are available mainly in river valleys either on valley floor or terraces or on alluvial fans and tallis cones. Settlements are confined only to these valleys. Map (IV.1) shows that there is a close relationship between drainage lines and settlements in Kargil. Settlements are found to be clustered near the confluence zone of rivers in all the river valleys of the region. The reason is that in the confluence zone, the valleys are wider and since the width of valley determines the number of settlements hence these tend to get clustered. To understand the impact of physical and economic constraints on site of settlements, the analysis of actual position of houses,cultivated lands, situation of religious centres i.e. mosque in

Table IV.2 Site and Situation of Facets of Settlements

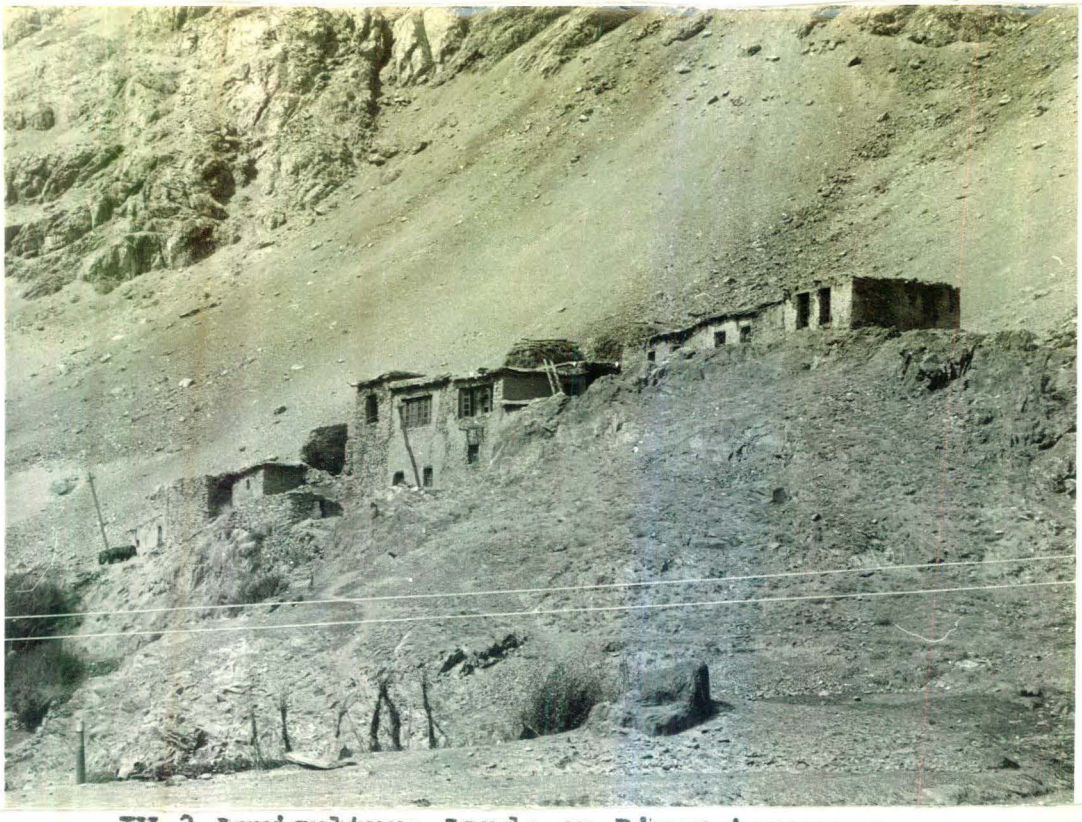
Village	Hillock	Steep rocky surfaces	Alluvial fans			Valley floor	River terraces
			Apex	Upper slope	Lower slope		
1. Bodhkhurbu	-	-	Gompa	Houses	Fields	-	Houses fields.
2. Garkon	House Fields	Gompa	-	-	-	-	-
3. Pandras	Houses, water tank mosque	-	-	-	-	Houses, Fields	-
4. Pushkum	-	-	-	Houses Mosque Imambar	Houses Fields	-	Houses Fields
5. Rangdum	-	-	-	Gompa	Houses	-	Houses Fields

Source: Field Work(1987).

IV.1 Settlements on valley Floor.

case of Muslim settlements and Gompa for the Buddhist settlements and their relationship with various geomorphological features is necessary. Table IV.2 highlights these features for five selected villages of tehsil. The table shows settlements in Suru valley are generally situated on the valley floor(Photograph IV.1) and river terraces. River terraces are generally well developed. Some of the settlements here are also situated on alluvial fans. The agriculture lands are found on river terraces and alluvial fans. The mosques are found in all Muslim settlements. The reasons for settlements to be situated on valley floor in Suru valley are reflected in the fact that this valley is comparatively wider and offers more land for agriculture than those of Dras and Indus. The easily available water and flat land in Suru valley are the main factors for most of settlements to be situated in this valley. In Dras and Indus valley the terrain is more rugged and hence very limited land is available for cultivation. The economic compulsions and the scarcity of cultivable land

IV.2 Settlements on elevated Lands.



IV.3 Agriculture Lands on River terraces

and on Valley Floor.

are the main reasons why settlements in Dras and Indus valleys are situated along the water channels on relatively elvated lands than the valley floor (Photograph IV.2), while agricultural lands are found on river terraces and alluvial fans (Photograph IV.3). It is on the valley floor and river terraces that soil cover is relatively thick and this explains cultivation on valley floor, lower slopes of alluvial fans and on river terraces.

Settlement Morphology And House Types

The analysis of spatial organization of settlements is incomplete without taking into account the settlement morphology in terms of settlement forms and shape. The study of house types and building material used in high altitude settlements is invariably a reflection of the natural environmental conditions.

In general physical factors affect the form and size of settlements in backward mountain areas. Cultural and historical factors at times influence

the pattern of roads and lanes, religious structures i.e. mosque, temples and Gompa etc. These affect the morphological characters of villages. Insecurity in the past and the present social make up of the villages are other significant factors affecting the external as well as internal morphology of a village. Morphology of settlements in Kargil is haphazard with narrow lanes and foot paths and with irregular spacing of buildings. It gives them generally irregular shape.

On the basis of the study of toposheet and the emprical evidence the following form of villages can be identified in the study area:

i. Elongated village

ii. Circular or semi circular village

iii. Haphazard village

iv. Double nucleated village.

Elongated Village:

This pattern is recognised by the arrangement of houses along a line or a series of lines, usually

IV.4 Semi-circular Village.

a water channel or a road. The settlement is prolonged in one direction and restricted in other due to certain physical constraints. If the site is a narrow strip, in between two streams, flowing closely together the villagesbecome elongated . The market situated along the newly build road also is responsible for elongation of village. Such form of villages are called street villages. Baroo, Panikhar, Dras and Pushkum form elongated shape.

Circular or Semi Circular Village:

Circular village pattern may have several variations and are the result of an attempt to build a maximum number of houses at one site. In Ladakh, this pattern seems to be the heritage of the past necessitated by a desire to have a higher site for building purposes. Moreover the natural growth of village according to the shape of available land appears to be a reason for this type of villages. Pandras is the finest examples of this form of villages found in Dras valley(Photograph IV.4). The village has developed on the lower slopes of mountain in

a semi circular form.

Haphazard Village:

It is common form of larger villages in Kargil. In this form houses are huddled in irregular fashion without following any definite plan. The larger villages generally consist of several hamlets with irregular pattern. Village Parkachik situated in upper Suru valley and Garkon situated in Indus valley are the fine examples of Haphazard villages. These have central street connecting the hamlets.(Photograph IV.5).

Double Nucleated Village:

A river or a minor stream is often the cause of such a pattern in mountainous lands. Sometimes a road, a tank may result in the development of twin settlements situated in either side of it. In Kargil such villages are found on the river banks or along the both sides of the roads. Bodhkhrbu is a fine example of village which has developed along the river bank on both sides of the Leh-Srinagar road.

IV.5 A Hapazard village

IV.6 A Typical Double storeyed House.

In all these settlementsforms houses are built quite close to each other. The main reasons for this are the inclement climatic conditions including strong winds and below freezing temperatures. By building houses very close to each other, the wind chill factor is reduced, and the warmth is retained in the compact structures. In most cases it is seen that these house clusters are in hamlets number of which form a village. It has also been observed that the irregular hamleted pattern is basically because the houses occupy rock outcrops as agricultural land is so limited that it cannot be earmarked for any other use.

In Kargil like other parts of Ladakh houses are generally double storeyed.(Photograph IV.6) . There are,however, cases of a few houses in various hamlets having 3-4 storeys are even a single storey. The ground floor generally has big rooms which are used for providing shelter to animals and one room is being used as storage space for fodder. The first floor or sometimes the second floor provide living place to the residents. Due to intense cold

leading to below freezing temperatures and strong cold winds during winter often make man and animal share the same room on the ground floor. It is mainly because the body warmth of cattle does not let the temperature fall too low. The first floor consists of 3-4 rooms. These are used as Kitchen cum living room, bed room and store. In Buddhist house one or two rooms on the first floor or the second floor are reserved for religious purposes. The idol of diety, religious books and other articles used in religious ceremonies are kept in these rooms. The average dimension of the bed room are 10'x10'. The other rooms are comparatively small. During winter months Kitchen cum living room also serves the purpose of sleeping room as the heat from the hearth keeps the room relatively warm. One of the unique features of houses is the dry latrine system. These latrines are usually found on first floor of the house and the night soil accumulates in a room immediately below on ground floor. This excreta mixed with soil is used as manure during the agricultural season. Latrine which is must in every house is also because of environmental conditions as during winter it is too cold to go to fields. Moreover, dry cold climate does not lead to strong stink.

IV.7 Flat roofs, reflecting aridity of reogion.

Throughout Kargil, the houses are made up of locally produced sun dried bricks and stones. Plinths and foundations upto a few feet are built of stones. Walls are constructed by using unburnt , sundried mud bricks or stones plastered with clay as climate does not lead to their erosion due to low precipitation. Walls are thick and provide insulation against extreme cold outside during winters. The door is very small and windows and ventilators only a few. It is because that wood is scarce and climate too cold to have large openings. It may, however, be pointed out that in recent years, the use of glass has increased significantly. It has almost become a status symbol to have glazed room facing the sun which otherwise also keeps the room comparatively warmer during day time. The roofs are flat (Photograph IV.7) and are built of clay mixed with poplar beams forming the ceiling. The gap between the wooden logs is covered with twigs of willow or poplar trees. The house tops are finally plastered with thick layer of mud mixed with straw. Since precipation is negligible, the house structure

has long life. No arrangement for escape of roof water are noticeable in houses which again reflects the aridity of the area. Roof top also serve an important function for storage of fuel wood and fodder for use during winter months.

From the above analysis it becomes clear that environmental impact is very strong on the houses of Kargil. The use of sun dried mud bricks instead of baked bricks and wood indicate the climatic aridity of the area on one hand and also reflect the scarcity of wood for construction and as fuel.[3] One to two feet thick mud brick walls are poor protection against severe cold conditions. These walls help in keeping warmth in and cold out during winters. The flat roofs found in all houses in Ladakh show low precipitation in the region. The small size of windows and doors found in all houses in Kargil is an indicator of scarcity of wood for house construction and it helps in preventing the extreme cold winds from entering the house during winters. The doors and windows generally are built on leeward side to check the cold.

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3. The locals also say that baked bricks considerably reduce insulation and also develop cracks during winter months.

During the past few years, post 1974, there has been a significant change in the building materials used especially around the tehsil headquarter Kargil and Dras area. The change has occurred keeping in with the pressure of tourism. As stated earlier it was in 1974 that Ladakh was operated to tourists and now every year more than 20000 foreigners visit Ladakh. The impact of this tourist inflow is reflected by the changes in building materials used in places where maximum number of tourist arrive. Glass windows cement and wood are being used in modern and new construction especially in government buildings, hotels and restaurants. All these materials are being procured from Kashmir valley. Keeping in with the local well-to-do families have started the use of glass, wood and cement in house construction in and around Kargil town.

Finally it can be concluded that settlement structure in Kargil is the result of both physical and cultural factors. Settlements are confined to river valleys situated along the drainage channels. Within a settlement , the arrangement of various buildings is the outcome of both physical and religious factor.

The houses and religious places occupy land which is otherwise unsuitable for agriculture purposes. Agricultural fields are generally situated on river terraces , valley floor and on alluvial fans. Settlement occupy only a small fraction of total geographical area. The distribution of settlements is uniform with evidence of clustering in some areas. The shape and form is irregular in case of most of the settlements. Building material is produced locally and shows an strong impact of environmental conditions. Wood for house construction is scarce. Dry latrine system is found in all dwellings and the exerta is used as manure. Changes in the traditional system are occuring due to tourist inflow. Impact of tourism is reflected in by the changes in the building material in areas where tourists arrival is maximum. Tourism need infrastructure to flourish, and it is quite logical to assume that settlements having maximum-potential have developed more than the surrounding settlements. Due to recent changes and tourism , a diversity and disparities have come up among settlements. Therefore study of socio-economic characters of settlements and hierarchy among them based on levels of development shall reveal disparities and the reasons for such a phenomenon. This has been attempted in next chapter.

CHAPTER - V

SOCIO - ECONOMIC DEVELOPMENT AND HIERARCHY OF SETTLEMENTS

Kargil, as brought out by the analysis in preceding chapters, is a backward high-altitude tehsil. The harsh mountainous topography, cold climate, finite resource base and limited manpower of the region has resulted in an agro-pastoral economy where technology is primitive and linkages between the settlement clusters are limited. All these factors have produced a unique system of human habitation where every settlement is more or less self sufficient. For centuries the population adapted to harsh environmental conditions and finite resource base. The inhospitable climate and complex relief created such conditions in which inter-regional mobility between settlement clusters was greatly restricted due to limited accessibility.

Before 1960, these environmental conditions and the lack of better technology resulted in retaining the traditional agro-pastoral subsistence economy with negligible influences from the socio-economic and technological changes that surrounding region of Kashmir valley experienced. Thus, there was

little difference between the economic status of settlements prior to 1960. However, the traditional system started showing changes after 1962. Following the Indo-China border conflict of 1962, the strategic importance of Ladakh region was realized and this resulted in stationing of a large size of Indian Army in entire region of Ladakh. More significant changes in Kargil came at the time of Indo-Pak war of 1965 as the region borders the ceasefire line with Pak occupied area. For the convenience of Army and to benefits of local population, a number of roads connecting the different micro units of the region were built. After 1966, the traditional system started showing changes when the Leh-Kargil-Srinagar road was completed. These factors widened the territorial linkages on one hand and accelerated the modernization processes on other. As stated earlier, Ladakh region was declared open to tourism in 1974 and it emerged as exotic mountain land on the international tourist map. With this the process of development started due to the economic factors which tourism brought with it. Since entire region is not open to tourists, the major changes came about in places of tourist interest and in villages situated around Leh-Srinagar highway. Consequently, some

developed pockets emerged leaving a large number of villages at a low level. Thus it is quite logical to assume that after 1974, the gap between settlements in terms of development widened in Ladakh. In keeping with the pressure of tourism naturually settlements having more tourist attraction and strategic importance became more developed in terms of socio-economic infra-structure. Tourism needs infra-structural facilities along with the natural attraction, to flourish and this perhaps explains the growth and development of Leh and Kargil towns and surrounding villages at a much faster rate than those situated in remote parts. Moreover, settlements in Ladakh, as stated earlier are situated in different valleys each emerging as "micro world" in itself. Obviously favourable location of some of these settlements gave them an edge to develop more than the rest. Thus, settlements along the road and the traditional trade routes developed more than the settlements situated in the interiors of river valleys. By this assumption it is expected that settlements around Kargil town and in the Suru and the Wakha valleys shall be at higher level of development in terms of socio-economic amenities than the others.

In the light of above this chapter is an attempt to work out a hierarchy of settlements on the basis of

selected indicators which highlight their socio-economic characteristics and the level of development. The ordering of settlements helps in assessing the existing infra-structural facilities.

The uniformity which appears in traditional way of life in Ladakh is a misleading impression. The forces of change operating in the region since 1960's have led to "the ordering of settlements at different levels of development or more accurately of under development".[1] In order to find out hierarchy of settlements in the region, the following are essential steps:

i. Selection of the indicators which will reflect the complex developmental process.

ii. Making a composite index based on the values of indicators.

iii. And to make classes in the series obtained by composition.

The most important step in this exercise is the selection of indicators which could catch the complex process of social and economic development and highlight these characteristics. Evolution of every civilization

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1. Moonis Raza and Harjit Singh, "Problems of Regional Development in the trans-Himalayas - A Case Study of Ladakh". Development of Hill Areas: Issues and Approaches, edited T.S. Popala et al Himalaya Pub. House, Bombay, 1983, pp. 238-59.

is a "flux of events in which socio-economic conditions are interlinked in a web of relationships".[2] No single indicator is capable of measuring complex structure, as different characteristics are reflected by different variables. Thus, socio-economic conditions and their levels can be analysed through various variables revealing different processes. The level of development of settlements in primitive societies is a reflection of man-environment interaction process. And the analysis of the developmental indicators shows the stage of this interaction and helps in identifying the regional disparities and relative importance of some factors in relation to other. It also helps to select settlements which have comparatively better conditions and more potentials for development on one hand and capabilities of transmitting growth impulses to surrounding settlements on the other.

The indicators chosen for the subsequent analysis are based on secondary data pertaining to the 102 inhabited villages of Kargil tehsil and the Kargil town. The following indicators have been selected to gauge the socio-economic conditions and the level of settlement in order to find out hierarchy among them.

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2. Ibid., p.243.

i. Population size of settlements

ii. Growth rate of population

iii. Sex ratio - negative indicator

iv. Literacy level

v. Female literacy

vi. Proportion workers engaged in non-Agricultural activities

vii. Infra-structural facilities

The indicators chosen are possibly the most relevant ones that could be sequeezed out of the extremely inadequate data base, and are relevant in view of the objectives of the study.

The size of population is an important indicator of development especially in Kargil, where main power is limited. The population size of a village has been found to have a positive correlation with the carrying capacity of land which continues to be largely determining factor in this cold-desertic region. It has also been seen in Kargil that larger is the population of a settlement greater is the availability of general infra structure. The assumption is also that larger the population of a village more will be the growth potential.

The second indicator relates to the decadal growth rate of population during 1971-81. As stated earlier

a high growth rate of population in a village of Ladakh of which Kargil is a sub-region, reflects a higher carrying capacity of land therein and an excess of inmigration over outmigration reveals stronger economic base.

Sex ratio is the another indicator chosen for the purpose. Sex ratio differentials in a backward region are noted either due to migration being male specific or due to higher female mortality. It has been generally observed that young males outmigrate from backward areas to developed settlements in search of jobs and better means of livelihood. This results in excess of females in the villages suffering from outmigration. The males generally out number females in economically developed settlements due to male specific inmigration. The number of females in underdeveloped settlements may also be less because of high female mortality which is quite common at the time of delivery of child due to lack of medical facilities. Moreover in Indian society, neglect of female children also results in high mortality. Thus sex ratio is good indicator to measure these trends. In Kargil males migrate to more developed settlements

in search of employment opportunities. The sex, ratio, however, is a negative indicator. That means higher the sex ratio lower is the level of development of a settlement. In order to make the indicator positive, its reciprocal values were calculated.

The fourth indicator is the literacy of population. Literacy is a index of culture and technological development of a society and reflects the degree of awareness and development of society. Literacy is linked with development in a bidirectional way i.e. higher literacy would lead to development and vice versa. The literacy , as seen in Chapter III is low in Kargil tehsil. There are some villages which have higher literacy and it is in these settlements that influences of modernization are observed more. The level of literacy thus show the speed at which changes are occuring in settlements. Moreover, settlements with higher literacy show greater potential of development on one hand and better quality of human resources on the other.

Female literacy is generally low in backward regions and it is an important indicator of development. Hence the study of female literacy will reveal the social awareness in the settlements of Kargil and

their degree of development because , as stated earlier, literacy is both cause and effect of development.

The sixth indicator pertains to the workers engaged in non-Agricultural activities. In a developed society percentage of workers engaged in non-primary sector generally increases. More so in a backward region like Kargil where primary sector especially agriculture predominates and workers in non-agricultural activities show level of economic diversification in the settlements.[3]

The last indicator is related to amenities presence which themselves raises the level of settlements. The values of the amenities were available as attributes that show their existence or otherwise. Therefore, to convert this into variable indicator these amenities and services were assigned weights. The weights allotted to each facility/amenity are as follow :

Amenity/Facility		Weightage assigned
i.	Education :	
	a. Basic activity centre/ Adult literacy school/primary school	1

3. This indicator, however, includes the other workers engaged in mining , livestock rearing, fishing and hunting etc. This could not be avoided because unfortunately 1981 census does not give data separately for secondary and tertiary sector.

Amenity/Facility	Weightage assigned
b. Middle School	2
c. High School	3
d. Higher Secondary School	4
II. Medical:	
a. Medical aid centre/Amchai Centre	1
b. Dispensary/T.B. Centre	2
c. Primary Health Centre	3
d. Hospital	4
III. Post and Telegraph:	
a. Post Office	1
b. Telegraph Office	2
c. Telephone	3
IV. Transport:	
a. Kaccha road/Foot path	1
b. Pucca road	2
c. Bus stand	2
V. Drinking water:	
a. Nalla/Spring/River	1
b. Tap water/water tank	2

The researcher is quite conscious of the arbitariness of the above weights. However, the weights allotted are based on the discussions with inhabitants of

varying socio-economic status of the study area. The assumption is that the preception of inhabitants who use these facilities would have corrected the arbitariness of the given weights.

The second important step, as stated earlier, in a multivarite analysis, is the composition of the values for all the indicators. There are various methods to form composite index which highlights the cumulative effects of spatially distributed phenomenon.[4]

In computing out the composite index, the method used in present study is explained by the following formula,[5]

$$CI = \frac{X_{11}}{\bar{X}_1} + \frac{X_{12}}{\bar{X}_2} + \text{----------} \frac{X_{1n}}{\bar{X}_n}$$

Where X_{11}, X_{12} ------- X_{1n} are the values of the different columns of the data matrix and CI is

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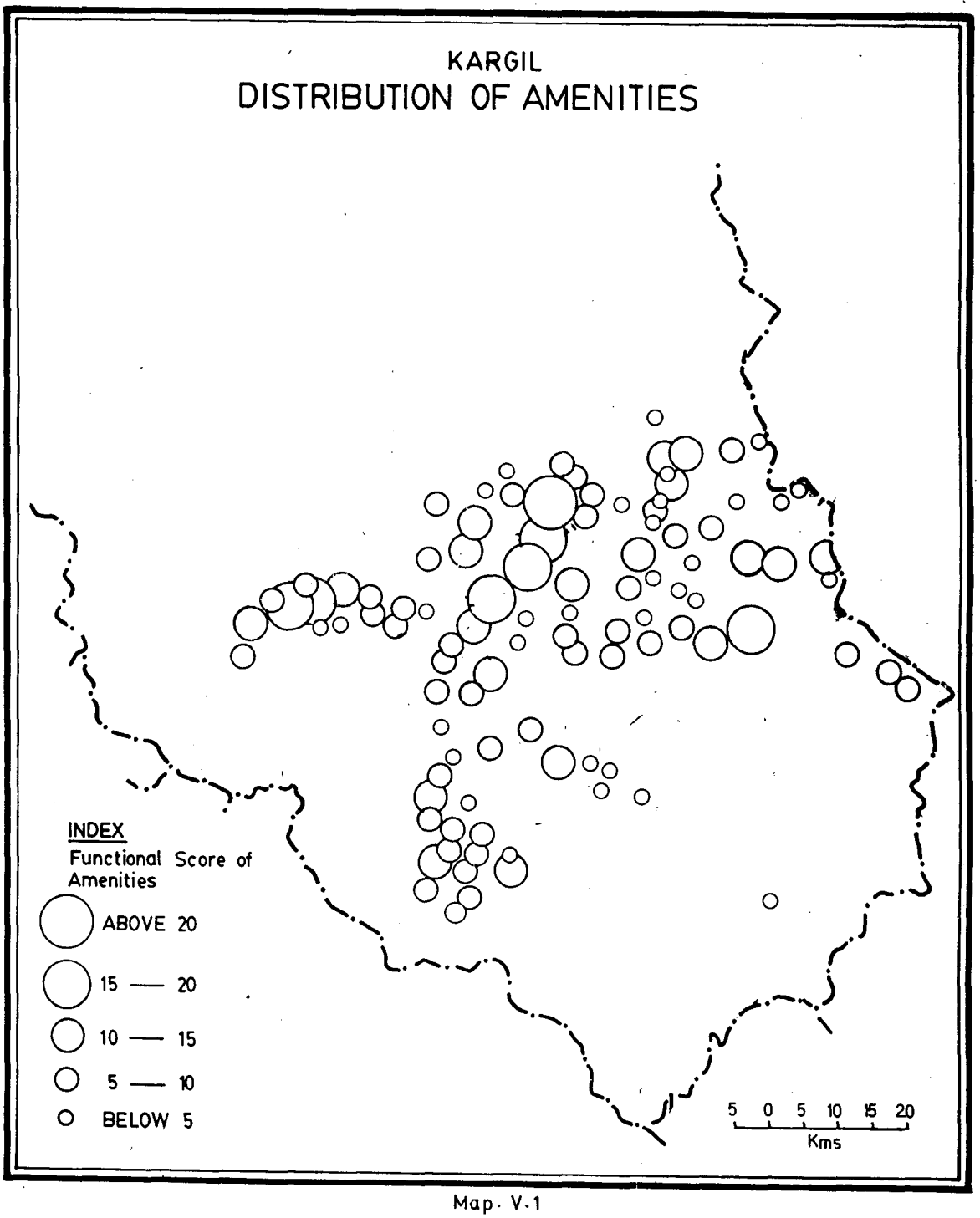
4. The methods have been discussed in various statistical books e.g. A. Mehmood, Statistical Methods in Geographical Studies, Vikas , New Delhi, 1977. L.J. King, Statistical Analysis in Geography, Prentice Hall, Eagle Word Cliffs, 1969. However, it is irrelevant to describe these methods here.

5. After H.Singh, Ladakh - Analysis of its Regional Structure, unpublished M.Phil, dissertation, J.N.U., 1972.


KARGIL
DISTRIBUTION OF AMENITIES
INDEX
Functional Score of Amenities
ABOVE 20
15 — 20
10 — 15
5 — 10
BELOW 5
5 0 5 10 15 20
Kms

Map. V.1

the composite index.

As explained by formula, the values were made scale free by dividing them by their respective means. This method takes care of contribution of each indicator. The raw data matrix thus obtained had 7 columns and 103 rows(102 rural settlements and 1 urban town). The scale free values were added row wise to get the composite index value for each settlement.

The mean value and standard deviation of composite index values were calculated. The standard deviation was taken as class interval, the settlements were grouped in each class accordingly in order to find out hierarchy among them.

Before discussing the hierarchy of settlements, which emerged from the analysis, it will be relevant to describe the distribution patterns of socio-economic amenities in the Kargil tehsil.

Table V.1 and map (V.1) shows that distribution of these facilities is very uneven.[6] Only Kargil town emerged as important settlement with large number of amenities getting a functional score of 54. As expected the villages surrounding the Kargil town got a higher score than those situated far away e.g. Baroo and Minji

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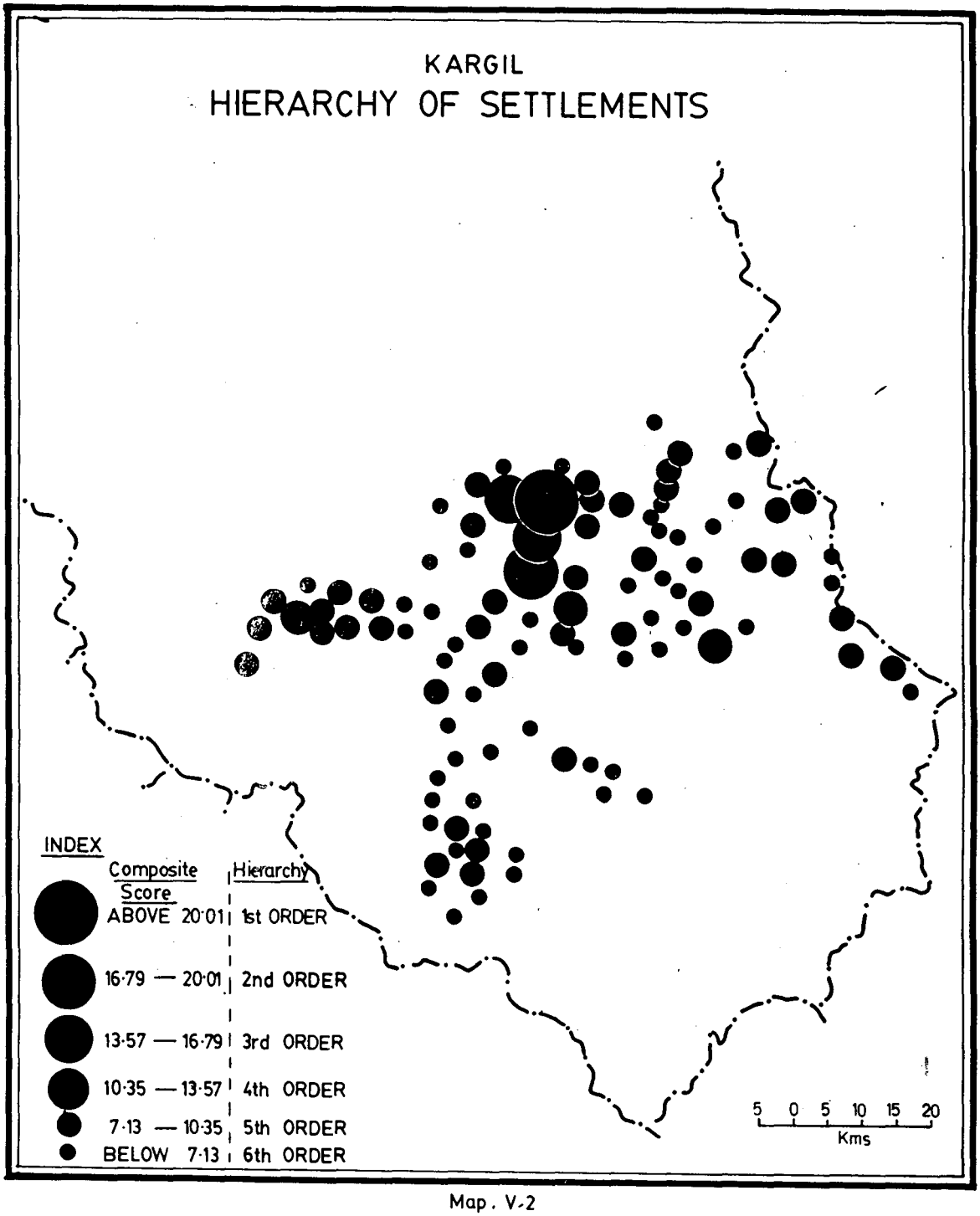
6. Appendix V.1 shows the amenities and facilities available in Kargil tehsil and the functional score of the amenities.

villages which are situated close to the town got scores of 17 and 15 respectively. In Dras valley Ramiburpora, Kharbu, Pandras and Shimsha got higher scores as these have better facilities. In Wakha valley Wakha and Malbek with a score of 15 and 14 respectively emerged as important settlement in terms of the concentration of amenities. Shakar, Chiktan and Haknis came out to be the important settlements in the Chiktan and Indus valleys.

Table V.1 : Distribution of Socio -Economic amenities

Functional score of amenities	No. of settlements in the functional group
Above 20	1
15-20	6
10-15	18
5-10	46
Less than 5	32

In upper Suru valley Panikhar enjoys more facilities than the surrounding settlements and it got a score of 15. It is mainly because Panikhar has emerged as an important market centre as well as tourist attraction as many trekking routes converge here. In middle Suru valley Thangdumru and Saleskot with a score of 15 and 11 respectively are the important settlements in terms of concentration of


KARGIL
HIERARCHY OF SETTLEMENTS
INDEX
Composite Score
Hierarchy
ABOVE 20·01
1st ORDER
16·79 — 20·01
2nd ORDER
13·57 — 16·79
3rd ORDER
10·35 — 13·57
4th ORDER
7·13 — 10·35
5th ORDER
BELOW 7·13
6th ORDER
5 0 5 10 15 20
Kms

Map. V-2

amenities. Both these are big villages. Thus the analysis of distribution of amenities in different valleys show that every cluster has one or two nodal settlements which have relatively better amenities. It is clear from the analysis that Kargil town, surrounding villages and larger villages in other areas have been able to attract more amenities and facilities whereas relatively smaller villages situated away from Kargil continue to be very backward.

Levels Of Development And Hierarchy Of Settlements

After the scrutiny of the socio-economic amenities in Kargil, it would be more relevant to present the analysis which emerged on the basis of the composite index. The composite index as stated earlier, was computed by adding the scale free values of the indicators by their means. The computed composite index values were divided into classes to work out the hierarchy of settlements.

Table V.2 and map (V.2) clearly shows the hierarchy among the settlements of the tehsil.As expected Kargil town emerges as the highest order settlement. Majority of villages scored value of less than means. The 5th and 6th order settlements numbering 37 and 59 respectively

have very low level of development. The reasons for Kargil emerging as the only 1st order settlement in entire tehsil are that it being the district headquarter has maximum potential and advantage for development. Kargil town acts as the main service centre for the villages of tehsil. Minji situated in lower Suru valley at a distance of 18 km. from Kargil town is the only 2nd order settlement. This settlement is surrounded by relatively lower order settlement . This settlement is surrounded by relatively lower order settlements and it appears to be the service centre for these backward settlements. Chuliskamba and Baroo both situated in the vicinity of Kargil town came out to be 3rd order settlements.

Table V.2 - Hierarchy of Settlements

Category	Value of C.I.	No. of settlements in the category	Order of settlements
More than Mean+4 S.D.	Above 20.01	1	I
Mean +3 S.D. to Mean + 4 S.D.	16.79-20.01	1	II
Mean +2 S.D. to Mean + 3 S.D.	13.57-16.79	2	III
Mean +1 S.D. to Mean + 2 S.D.	10.35-13.57	3	IV
Mean to Mean + 1 S.D.	7.13-10.35	37	V
Below Mean	Less than 7.13	59	VI

All 1st , 2nd and 3rd order settlements are situated within a radius of 20 km of the town. The distribution pattern of higher order settlements clearly show that all developmental activity is concentrated in and around Kargil town and all other areas continue to be backward. All villages in the upper and middle Suru valley, Dras, Wakha and Indus valleys scored lower orders.

The following glaring points emerged from the analysis:

i. Dras, Wakha and Indus valleys do not have any higher order settlements. There is need to pay special attention to these areas in order to remove disparities. This can be done if some higher order functions/amenities are introduced in some of these settlements. It is suggested that largest settlements in terms of population may be selected for this purpose. Thus there is need to develop Rambirpora and Goshan in the Dras valley, Pushkum and Wakha in the Wakha valley,& Shakar in the Indus valley. It is hoped that development in these settlements shall have spread effect in surrounding backward villages as well. These can act as potential growth centres and shall radiate impulses of growth to the surrounding settlements.

ii. Villages connected with the Kargil town with Pucca road emerged, generally, as more developed in terms of socio-economic amenities.

Thus it appears that transport and overall development have positive correlation. It has also been seen that transport is a pre-requisite for any change in these isolated areas. Therefore, special attention needs to be paid to strengthen transport links.

To conclude it can be said settlements in Kargil show high level of disparities. The settlements in and around Kargil are more developed than the settlements of Dras, Indus and Wakha valleys. The 1st, 2nd and 3rd order settlements are situated within radius of 20 kms from Kargil town. Both natural and man made factors are responsible for these disparities. The gap can be narrowed by paying special attention to atleast one or two nodal settlements in different valleys. It would accelerate the process of development and help in decreasing the existing disparities.

SUMMARY OF CONCLUSIONS

I.1 The study of man-environment relationship in backward mountainous lands is the reflection of the stage of development of the region.

I.2 Kargil, a sub-region of Ladakh, is a backward high attitude area where environment plays an important role in all aspects of human life.

II.1 Kargil region has highly complex geological structure and the outcrops have undergone folding and faulting. The three broad tectonics zone are:

a. The Tethyan Zone
b. Indus Zone
c. Ladakh Zone

II.2 The terrain is rugged and average slope varies from 0^{o} to 20^{o} and above.The low slope zone more or less corresponds with river valleys of tehsil.

II.3 River valleys in Kargil are embryo of the socio-economic activities and human occupance. 48 villages are situated in Suru valley, 20 each in Wakha and Dras valley and 16 in Indus valley.

II.4 The soils of region are poor, soil cover is thin and their moisture retaining capacity is low.

II.5 The water resource are scarce and majority of streams are of first order. The drainage density for all the basins is low, bifurcation ratio varies from 6.15 to 2.

II.6 The location of Kargil in trans-Himalayan rain shadow zone, intense solar radition and local relief are the factors responsible for cold-desertic climate of the land.

II.7 For 5 to 6 months, on an average the temperature drops down below freezing point. The precipation is scanty and most of it occurs during winter months. Dras is colder than Kargil.

II.8 Natural vegetation of the region consists of wild grasses and small bushes mainly found in few pockets around streams and these serve as pastures during summer months.

II.9 The region is very poor in mineral resources.

II.10 Climate has pronounced impact on socio economic life.

III.1 Strong environmental impacts are reflected on different attributes of settlements such as location, site and situation and settlements have evolved in consonance to physical and cultural factors.

III.2 The earliest habitants were an ancient tribe of Tibetan nomads. Permanent settlements evolved with arrival of Mons from Northern India and Dards from Gilgit. Till 16th century, most of the population of tehsil was Buddhist.

III.3 The distribution and density of population is governed by physical factors and carrying capacity of land. Maximum concentration of population is in wide and flat Suru valley accumulating 65.80 per cent of the total population of the tehsil and density of population here is maximum (23 persons per sq.km).

III.4 Population growth rate has been slow upto 1951-61. The growth rate of population during 1961-71 and 1971-81 was more than 20 per cent.

III.5 The highest growth rate in 1971-81 was recorded in block Shakarchiktan and lowest in Tesuru. Male specific inmigration is responsible for high growth rate and male specific outmigration for low growth rate.

III.6 Settlements situated in the interior of valleys and which are relatively inaccessible, showed negative growth rate and settlements in and around Kargil town showed a high positive growth rate.

III.7 Sex ratio is high in the backward blocks and in the villages situated either along the borders of the tehsil or in interior of river valleys, and low in the administrative headquarters and the villages around them.

III.8 Sex ratio came down in all blocks during 1971-81. Male selective outmigration seems to have decreased over the years and inmigration of male workers increased especially in areas where new institutions and projects have been started in recent years.

III.9 Literacy of population is low in the Kargil tehsil, and female literacy is very low. Number and percentage of literate has increased over the years. Literacy was highest in 1971, 1981 in Dras block and lowest in 1961, 1971 in Sankoo and Tesuru in 1981.

III.10 More intensive use of land under cultivation has been made in small sized blocks.

III.11 Workers engaged in agricultural activities are overwhelmingly predominant. Proportion of female cultivators was over 90 per cent in 1981.

IV.1 There are limited communication and other amenities in the tehsil. Settlements are generally self-subsistant.

IV.2 All settlements are situated in river valleys and there is a close relationship between settlements and drainage lines. Clustering is generally common near confluence zone. All valleys have uniform pattern of settlement distribution.

IV.3 Site and situation of settlements in Kargil is determined by both physical and economic factors. Agricultural lands are found on river terraces, alluvial fans and valley floor while structures are built on relatively higher rocky lands,which is not suitable for other economic uses.

IV.4 Settlement morphology, building materials used in a house and house plan reflect impact of natural environment particular of climate. Sun dried mud bricks are used in house construction. Flat roof tops are found in all houses and show the aridity of the region. Minimum number of windows or ventilators were found in house structures throughout the study area, in general and particularly in Dras where climate is very severe.

IV.5 The following four types of settlements in terms of shape are common in Kargil:

i. Elongated
ii. Circular or semi circular

iii. Hapazard

iv. Double nucleated

V.1 Settlements along trade routes and having maximum tourist potential and situated along Leh-Srinagar road are more developed.

V.2 Kargil town and settlements situated within its close proximity emerged as more developed in terms of socio-economic facilities.

V.3 Kargil town emerged as the only first order Settlement and Miniji as the only second order settlement in terms of levels of development.

V.4 There is need to develop at least one or two settlements in Dras, Wakha and Indus valleys.

APPENDIX III.1

(LIST OF VILLAGE IN DIFFERENT DEVELOPMENTAL BLOCKS)

Block	Name of village in the block	Location code No. as per 1981 census
Dras	1. HARIPORO (UNINHABITATED)	85
	2. TRANKUCHAN	86
	3. MATAYAN	87
	4. PANDRAS	88
	5. BATOKUL (UNINHABITATED)	89
	6. MUSHKU	90
	7. HULYAL	91
	8. MURADBAGH	92
	9. GOSHAN	93
	10. RAMBIRPUR	94
	11. GINDIAL	95
	12. BIMBAT	96
	13. THRANGOS	97
	14. CHOKIAL	98
	15. JUSGUND	99
	16. THASGAM	100
	17. KAKSAR	101
	18. KHARBU	82
	19. SHIMSHA	83
	20. YIBU	84
Kargil	1. SHILIKCHE	1
	2. POEN	2
	3. PARTAPGANJ	3
	4. AKCHAMAL	4
	5. TOUMEL	5
	6. APATI	7
	7. YOURBALTAK	6
	8. LALUNG	8
	9. SILMO	9
	10. CHULICHAN	10
	11. DERCHIKS	11
	12. GARKON	12
	13. KARKIT	102
	14. PHULTUKS	103
	15. HARDAS	104
	16. BATAMBIS	42
	17. MINJI	79
	18. BAROO	80
	19. CHULISKAMBO	81
	20. CHOSKAR	40

Block	Name of the village in the block	Location code No. as per 1981 census
Contd....		
	21. SAFI	45
	22. BARCHE	16
SHAKARCHIKTAN	1. SHAKAR	27
	2. HAKNIS	28
	3. CHIKTAN	29
	4. KUKSHO	30
	5. SAMRAY	31
	6. STAKTSE	32
	7. BODHKHARBU	14
	8. HINKAU	34
	9. SANJAK	13
	10. YOGAKHAMBU	14
	11. LAMSUSAND	15
SHERGOL	1. KUKSTE	17
	2. PUSHKUM	18
	3. LOCHUM	19
	4. DARKET	20
	5. NUNAMCHE	21
	6. SHERGOL	22
	7. MALBEK	23
	8. WAKHA	24
	9. TACHE	25
	10. KARIT	26
	11. KHACHE	35
	12. PHUH	36
	13. KARAMBA	37
	14. TINGDO	38
	15. SKAMBA	39
SANKOO	1. STAKPA	72
	2. UMBA	73
	3. NAGMAKKUSARA	74
	4. LANKARCHE	75
	5. FARONA	76
	6. SALESKOT	77
	7. TRINGSPON	73
	8. KANOR	41
	9. TAMBIS	43
	10. GUND MANGALPUR	44
	11. THANGDUMRU	46
	12. KHASGAMTHVENA	47

Block		Name of the village in the block	Location code No as per 1981 census
Contd..	13.	SANGROAH	48
	14.	BARSO	49
	15.	BARTU	50
	16.	SHERGANDI	51
	17.	ICHU	52
	18.	KHANDI	54
	19.	KARCHEKAR	55
TESURU	1.	KHANS	56
	2.	NAMSURU	57
	3.	THULSPURA	58
	4.	TESURU	59
	5.	PARKACHIK	60
	6.	KOCHIK	61
	7.	TANGOL	62
	8.	ACHAMBUR	63
	9.	CHOSKAR	64
	10.	PRANTI	65
	11.	PANIKHAR	66
	12.	KARGI	67
	13.	YULJUK	68
	14.	PURTIKCHE	69
	15.	GYALING	70
	16.	KARPOKHAR	71
	17.	RANGDOM	53

Total : 104

Uninhabitated village - 2

S.No.	Name of village	Growth rate of population	
		1961-71	1971-81
1.	HARIPORO	-	-
2.	TRANKUCHAN	22.86	19.72
3.	MATAYAN	22.72	32.87
4.	PANDRAS	6.92	1.43
5.	BATOKUL	-	-
6.	MUSHKU	50.26	-11.14
7.	HULYAL	22.95	27.80
8.	MURADBAGH	24.31	22.50
9.	GOSHAN	17.86	22.44
10.	RAMBIRPUR	42.10	25.57
11.	GINDIAL	7.26	27.08
12.	BIMBAT	33.01	34.51
13.	THRANGOS	28.66	8.80
14.	CHOKIAL	6.06	8.44
15.	JUSGUND	14.68	28.65
16.	THASGAM	3.10	2.45
17.	KAKSAR	-12.46	-9.59
18.	KHARBU	18.76	17.61
19.	SHIMSHA	24.24	18.29
20.	YIBU	10.20	25.61
21.	SHILIKCHE	15.83	74.53
22.	POEN	22.48	60.54
23.	PARTAPGANJ	19.19	33.89
24.	AKCHAMAL	25.36	22.03
25.	TOUMEL	12.25	13.01
26.	YOURBALTAK	11.29	35.33
27.	APATI	25.69	30.54
28.	LALUNG	10.19	4.50
29.	SILMO	23.26	32.76
30.	CHULICHAN	16.74	-12.96
31.	DERCHIKS	2.38	6.64
32.	GARKON	3.19	3.33

S.No.	Name of village	Growth rate of population 1961-71	1971-81
33.	KARKIT	20.27	51.05
34.	PHULTUKS	50.0	37.87
35.	HARDAS	3.09	28.29
36.	BATAMBIS	19.75	5.15
37.	MINJI	32.53	16.25
38.	BAROO	14.38	13.93
39.	CHULISKAMBO	21.40	15.70
40.	CHOSKAR	24.03	37.09
41.	SAFI	7.85	8.39
42.	BARCHE	20.24	8.93
43.	SHAKAR	17.17	29.37
44.	HAKNIS	-	29.72
45.	CHIKTAN	29.57	25.72
46.	KUKSHO	5.39	15.36
47.	SAMRAY	4.94	27.60
48.	STAKSE	25.74	23.00
49.	BODHKHARBU	23.35	38.85
50.	MINAKU	-0.57	11.04
51.	SANJAK	7.29	84.35
52.	YOGAKHARBU	28.84	35.82
53.	LAMSUSAND	N.A.	15.71
54.	KUKSTE	9.52	16.14
55.	PUSHKUM	19.10	34.41
56.	LOCHUM	4.40	30.72
57.	DARKET	36.84	24.03
58.	NUNAMCHE	25.00	33.33
59.	SHERGOL	18.39	25.24
60.	MALBEK	17.46	28.53

Contd.....

S.No.	Name of village	Growth rate of population	
		1961-71	1971-81
61.	WAKHAH	16.80	16.48
62.	TACHE	22.70	23.07
63.	KARIT	12.44	0.81
64.	KHACHE	5.66	20.30
65.	PHUH	20.20	18.76
66.	KARAMBA	7.50	16.86
67.	TINGDO	19.37	16.88
68.	SKAMBO	20.18	23.82
69.	STAKPA	21.40	21.84
70.	UMBA	17.36	42.46
71.	NAGMAKUSARA	20.00	6.66
72.	LANKARCHE	20.02	13.29
73.	FARONA	16.51	13.91
74.	SALESKOT	14.26	26.17
75.	TRINGSPON	11.88	19.06
76.	KANOR	9.42	36.47
77.	TAMBIS	22.48	22.75
78.	GUND MANGALPUR	14.96	16.27
79.	THANGDOMRU	38.72	18.21
80.	KHAASGAM THVEVNA	36.57	17.25
81.	SANGROH	20.90	11.35
82.	BARSO	76.80	27.16
83.	BARTU	30.95	5.17
84.	SHERGANDI	23.23	15.57
85.	ICHU	39.47	-11.32
86.	KHANDI	19.85	18.07
87.	KARCHEKHAR	12.14	14.16
88.	KHANS	27.48	12.87

Contd...

III.2(Contd).

S.NO.	Name of village	Growth rate of population	
		1961-71	1971-81
89.	NAMSURU	19.80	32.26
90.	THULSPURSA	39.66	16.56
91.	TESURU	34.42	-13.71
92.	PARKACHIK	7.79	28.91
93.	KOCHIK	14.96	13.01
94.	TANGOL	21.32	10.30
95.	ACHAMBUR	9.82	40.65
96.	CHOSKAR	8.97	21.60
97.	PRANTI	15.97	43.11
98.	PANIKHAR	31.06	16.93
99.	KARGI	23.60	57.92
100.	YULJUK	29.25	18.41
101.	PURTIKCHE	32.65	20.37
102.	GYALING	17.79	41.23
103.	KARPOKHAR	21.73	51.78
104.	RANGDUM	46.53	16.89

S.No.	Name of Village	Sex Ratio		
		1961	1971	1981
1.	HARIPORO	-	-	-
2.	TRANKUCHAN	1092	846	811
3.	MATAYAN	777	616	852
4.	PANDRAS	710	829	1065
5.	BATOKUL	333	-	-
6.	MUSHKU	736	1021	783
7.	HULYAL	902	912	925
8.	MURADBAGH	831	782	668
9.	GOSHAN	1042	888	920
10.	RAMBIRPUR	357	760	788
11.	GINDIAL	945	828	921
12.	BIMBAT	904	949	841
13.	THRANGOS	1054	1144	981
14.	CHOKIAL	870	1085	1062
15.	JUSGAND	1014	917	936
16.	THASGAND	926	807	942
17.	KAKSAR	578	839	984
18.	KHARBU	993	968	694
19.	SHIMSA	1175	975	819
20.	YIBU	1085	917	717
21.	SHILIKCHE	1025	963	798
22.	POEN	841	882	827
23.	PARTAPGANG	546	735	717
24.	AKCHAMAL	1029	954	770
25.	TOUMEL	812	845	1013
26.	YOURBALTAK	934	915	777
27.	APATI			

S.No.	Name of village	Sex Ratio		
		1961	1971	1981
28.	LALUNG	1005	932	891
29.	SILMO	988	1047	807
30.	CHULICHAN	1027	1060	969
31.	DERCHIKS	808	894	753
32.	GARKON	1035	1019	847
33.	KARKIT	907	971	942
34.	PHULTUKS	913	1000	1167
35.	HARDAS	605	792	887
36.	BATAMBIS	820	920	804
37.	MINJI	1088	955	850
38.	BAROO	697	933	869
39.	CHULISKAMBO	1034	910	1089
40.	CHOSKAR	935	1089	767
41.	SAFI	1187	1120	889
42.	BARCHE	819	914	822
43	SHAKAR	1018	1025	850
44.	HAKNIS	-	934	877
45.	CHIKTAN	981	971	960
46.	KUKSHO	882	922	821
47.	SAMRAY	892	909	787
48.	STAKSE	961	991	797
49.	BODHKHARBU	786	863	760
50.	MINAKU	765	1097	969
51.	SANJAK	873	909	843
52.	YOGAKHARBU	962	1015	1233
53.	LAMSUSAND	-	1034	966

Contd..

S.No.	Name of Village	Sex Ratio		
		1961	1971	1981
54.	KUKSTE	1013	1037	1078
55.	PUSHKUM	974	927	882
56.	LOCHUM	1064	1155	1028
57	DARKET	1054	857	954
58.	NUNAMCHE	1153	1234	842
59.	SHERGOL	1023	1102	969
60.	MALBEK	890	1134	812
61.	WAKHAH	894	1041	911
62.	TACHE	990	814	656
63.	KARIT	954	781	892
64.	KHACHE	871	1039	903
65.	PHUH	966	983	859
66.	KARAMBA	1000	1023	794
67.	TINGDO	1186	1333	1168
68.	SKAMBO	731	882	843
69.	STAKPA	1006	928	733
70.	UMBA	980	972	864
71.	NAGMAKUSARA	1040	1042	954
72.	LANKARCHE	913	855	794
73.	FARONA	947	911	905
74.	SALESKOT	980	901	870
75.	TRINGSPON	1104	983	888
76.	KANOR	991	949	913
77.	TAMBIS	1057	980	855
78.	GUND MANGALPUR	946	963	825
79.	THANGDOMRU	997	1050	818
80.	KHAASGAM THVEVNA	1032	975	835
81.	SANGROH	898	940	693
82.	BARSO	997	980	772
83.	BARTU	968	1024	891
84.	SHERGANDI	1006	906	880
85.	ICHU	1111	827	628
86.	KHANDI	923	891	827
87.	KARCHEKHAR	1172	1025	712

III·3

S.No.	Name of village	Sex Ratio		
		1961	1971	1981
88.	KHANS	1062	1012	875
89.	NAMSURU	873	865	746
90.	THULSPURSA	728	898	894
91.	TESURU	781	975	725
92.	PARKACHIK	870	759	550
93.	KOCHIK	1015	1085	964
94.	TANGOL	888	952	896
95.	ACHAMBUR	866	1033	925
96.	CHOSKAR	1000	970	852
97.	PRANTI	1000	1027	1012
98.	PANIKHAR	839	953	902
99.	KARGI	851	907	763
100.	YULJUK	1008	940	830
101.	PURTIKCHE	916	982	725
102.	GYALING	940	1107	859
103.	KARPOKHAR	1000	600	603
104.	RANGDUM	603	761	747

CHANGE OF LITERACY IN TOTAL POPULATION

Sl.No.	Name of Village	Percentage of literates to total population 1961	1971	1981
1	HARIPORO	----------(uninhabitated)---------		
2	TRANKUCHAN	0.34	14.72	25.98
3	KATAYAN	2.27	11.11	22.79
4	PANDRAS	10.00	19.06	34.03
5	BATOKUL	----------(uninhabitated)----------		
6	MUSHKU	4.18	9.05	22.74
7	HULYAL	4.08	9.54	22.07
8	MURADBAGH	5.50	11.43	33.13
9	BOSHAN	0.23	12.20	18.16
10	RAMBIRPUR	0.21	24.10	39.23
11	GINDIAL	5.02	13.02	26.63
12	BIMBAT	5.03	16.07	26.88
13	THRANGOS	3.33	15.02	29.52
14	CHOKIAL	5.20	8.71	42.21
15	JUSGUND	0.00	1.82	22.74
16	THASGAM	3.16	5.52	28.74
17	KAKSAR	9.92	11.91	21.48
18	KHARBU	11.69	18.65	33.03
19	SHIMSHA	5.55	8.13	28.17
20	YIBU	7.48	13.27	30.95
21	SHILIKCHE	8.69	9.38	23.80
22	POEN	16.50	19.53	26.87
23	PRATAPGANJ	15.15	27.11	32.91
24	AKCHAMAL	4.84	13.65	24.92
25	TOUMEL	1.88	7.26	14.16
26	YOURBALTAK	0.95	5.50	6.66
27	APATI	11.60	4.61	28.78
28	LALUNG	3.58	4.75	2.87
29	SILMO	6.34	8.42	24.20
30	CHULICHAN	4.58	1.77	13.99
31	DERCHIKS	4.77	1.76	10.49
32	GARKON	4.91	4.19	6.45
33	KARKIT	38.98	4.28	12.01
34	PHULTUKS	0.00	0.00	16.16
35	HARDAS	8.38	2.59	16.99
36	BATAMBIS	1.85	0.51	16.84

Sl.No.	Name of Village	Percentage of literates to total population		
		1961	1971	1981
37	MINJI	6.02	0.59	23.16
38	BAROO	13.11	17.80	38.96
39	CHULISKAMBO	6.02	6.88	15.95
40	CHOSKAR	3.58	5.71	19.35
41	SAFI	4.88	1.36	7.53
42	BARCHE	10.74	8.59	9.46
43	SHAKAR	6.34	6.42	17.51
44	HAKNIS	-	17.13	40.97
45	CHIKTAN	5.39	9.05	20.74
46	KUKSHO	-	2.15	4.43
47	SAMRAY	3.71	14.55	24.80
48	STAKSE	3.88	13.74	23.03
49	BODHKHARBU	4.86	8.75	15.05
50	HINAKU	11.56	5.81	12.04
51	SANJAK	15.03	21.08	25.09
52	YOGAKHAMBU	5.77	12.68	22.52
53	LAMSUSAND	N.A.	6.02	10.40
54	KUKSTE	4.76	4.96	13.36
55	PUSHKUM	6.66	12.61	21.13
56	LOCHUM	13.20	14.45	17.51
57	DARKET	3.14	8.29	15.20
58	NUNAMCHE	3.94	7.69	29.45
59	SHERGOL	10.91	6.79	41.86
60	MALBEK	6.66	10.79	29.83
61	WAKHAH	8.47	11.65	29.19
62	TACHE	1.93	11.02	18.84
63	KARIT	0.92	11.86	10.56
64	KHACHE	3.64	4.59	22.29
65	PHUH	1.34	2.80	9.90
66	KARAMBA	2.50	10.46	13.43
67	TINGDO	0.00	1.29	15.55
68	SKAMBO	7.51	12.10	20.18
69	STAKPA	1.91	3.68	14.68
70	UMBA	2.57	6.84	15.38
71	NAGMAKUSARA	6.75	7.08	8.78

(contd.)

Sl.No.	Name of Village	Percentage of literates to total population		
		1961	1971	1981
72	LANKARCHE	0.99	6.32	7.92
73	PARONA	2.10	6.95	14.02
74	SALESKOT	5.76	6.24	14.46
75	TRINGSPON	2.24	6.85	6.88
76	KANOR	4.82	5.21	14.53
77	TAMBIS	1.60	4.04	12.06
78	GUND MANGALPUR	3.16	3.37	13.99
79	THANGDURMU	4.46	6.55	19.00
80	KHAASGAM THVENA	2.18	3.91	10.16
81	SANGROH	3.27	5.93	17.80
82	BARSO	3.54	5.89	19.74
83	BARTU	3.17	1.21	8.23
84	SHERGANDI	0.00	0.81	4.25
85	ICHU	0.00	0.00	19.14
86	KHANDI	0.18	3.61	10.84
87	KARCHEKHAR	2.12	5.20	13.13
88	KHANS	0.00	5.08	11.93
89	NAMSURU	0.63	0.63	14.71
90	THULSPURSA	0.00	4.14	9.64
91	TESURU	3.68	6.40	28.97
92	PARKACHIK	1.73	3.21	5.29
93	KOCHIK	0.00	6.16	27.27
94	TANGOL	1.47	1.81	14.28
95	ACHAMBUR	1.78	4.87	14.06
96	CHOSKAR	0.00	3.01	12.20
97	PRANTI	10.82	16.00	35.40
98	PANIKHAR	20.38	21.77	37.17
99	KARGI	0.40	6.70	12.80
100	YULJUK	1.96	4.22	13.40
101	PURTIKCHE	2.17	4.73	21.53
102	GYALING	1.03	2.50	5.06
103	KARPOKHAR	0.00	1.78	9.41
104	RANGDUM	26.73	20.27	13.87

APPENDIX v.1

NUMBER OF AMENITIES AVAILABLE
(1981)

S. No.	Name of the village	Education					Medical						P&T Commun.			Tpt		Drinking water			C.I.
		Basic	Pr. Sch.	Middle Sch.	High Sch.	Hr. Sec	MAC/ Amchi	Disp.	PHC	Hosp.	Others	Other med. cent.	Post Off.	P&T Off.	Tel.	Bus stand	Road	N	River	Tap water	
1.	Kargil	3	6	3	1	1	-	5	1	2	5	-	-	1	1	2	PR	1	1	2	54
2.	Haripora	-	(Uninhabitated)																		
3.	Trankuchan	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	KR	1	-	-	3
4.	Matayan	-	1	1	-	-	-	-	-	-	-	1	1	-	-	-	R	1	-	-	8
5.	Pandras	-	1	1	-	-	-	-	-	-	-	1	1	-	-	BS	PR	SP 1	-	-	10
6.	Batokul	(Uninhabitated)																			
7.	Mushku	-	1	-	-	-	-	-	-	-	-	1	-	-	-	1	PR	1	-	-	7
8.	Hulyal	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	KR	1	-	-	3
9.	Muradbagh	-	1	1	-	-	-	-	-	-	-	-	-	-	-	1	PR	1	-	-	8
10.	Goshan	-	1	-	-	-	-	-	-	-	-	-	-	1	-	1	PR	1	-	1	10
11.	Rambirpur	-	2	1	1	-	-	-	1	-	-	-	-	-	-	-	PR	1	-	-	15
12.	Gindial	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	KR	1	-	-	6
13.	Bimbat	-	2	1	-	-	-	-	-	-	-	-	-	-	-	BS	PR	1	-	-	9
14.	Phrangos	-	-	-	-	-	-	-	-	-	-	-	-	-	-	BS	PR	1	-	-	5
15.	Chokial	-	2	-	-	-	-	-	-	-	-	1	-	-	-	BS	PR	1	-	-	8
16.	Thasgam	-	1	-	-	-	-	-	-	-	-	1	-	-	-	BS	PR	-	-	-	4
17.	Kaksar	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	FP	1	-	1	5
18.	Kharbu	-	1	1	1	-	-	-	-	-	-	-	1	-	-	BS	PR	1	-	-	11

S. No.	Name of the village	Education					Medical						P&T Commun			Tpt		Drinking water			C.I.
		Basic	Pr. Sch.	Middle Sch.	High Sch.	Hr. Sec.	MAC/ Amchi	Disp.	PHC	Hosp.	Others	Other med. cent.	Post Off.	P&T Off.	Tel.	Bus Stand	Rd.	N	River	Tap water	
19.	Shimsha	-	2	-	-	-	-	1	-	-	-	-	-	-	-	BS	PR	1	-	-	10
20.	Jusgund	-	3	-	-	-	-	-	-	-	-	-	-	-	-	BS	PR	1	-	-	8
21.	Yibu	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	KR	1	-	-	3
22.	Shilikche	1	2	1	-	-	-	-	-	-	-	-	-	-	-	-	FP	-	1	-	7
23.	Poen	-	2	1	-	-	-	-	-	-	-	-	-	-	-	-	KR	-	1	-	6
24.	Partapganj	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	PR	-	1	-	4
25.	Akchamal	-	-	1	1	-	-	-	-	-	-	1	-	-	-	BS	PR	1	-	-	11
26.	Toumel	-	1	-	-	-	-	-	-	-	-	1	1	-	-	-	KR	1	1	-	7
27.	Yourbaltak	-	-	1	-	-	-	-	-	-	-	1	1	-	-	-	KR	SP 1	-	-	6
28.	Apati	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	KR	1	-	-	3
29.	Lalung	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	KR	1	-	-	3
30.	Silmo	1	4	1	-	-	-	-	-	-	-	-	1	-	-	-	KR	1	-	-	10
31.	Chulichan	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	KR	1	-	-	4
32.	Derchiks	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-BS	KR	1	-	-	5
33.	Garkon	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	KR	1	-	-	4
34.	Karkit	-	4	1	-	-	-	-	-	-	-	1	1	-	-	-	PR	1	-	-	12
35.	Phultuks	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	KR	1	-	-	3
36.	Hardas	1	1	1	-	-	-	1	-	-	-	-	1	-	-	-	FP	1	-	-	9

S. No.	Name of the village	Education					Medical						P&T Commun			Tpt		Drinking water			C.I.
		Basic	Pr. Sch	Middle Sch.	High Sch.	Hr. Sec.	MAC/ Amchi	Disp.	PHC	Hosp.	Others	Other med. cent.	Post Off.	P&T Off.	Tel.	Bus Stand	Rd.	N	River	Tap water	
37.	Batambas	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	KR	SP1	-	-	3
38.	Minji	1	4	1	-	-	-	-	-	-	-	1	1	-	-	BS	PR	1	-	-	15
39.	Baroo	1	3	1	-	-	-	-	-	-	-	TB1	-	1	-	BS	PR	SP1	-	1	17
40.	Chuliskambo	-	1	-	-	-	-	-	-	-	-	-	-	1	-	BS	PR	SP1	-	1	17
41.	Choskar	1	5	-	-	-	-	1	-	-	-	-	-	-	-	-	PR	2	-	-	12
42.	Safi	-	2	-	-	-	-	-	-	-	-	-	-	-	-	BS	KR	1	-	-	6
43.	Barche	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	KR	SP1	-	-	4
44.	Shakar	-	2	1	-	-	-	1	-	-	-	-	1	-	-	BS	PR	SP2	-	-	13
45.	Haknis	-	2	1	1	-	-	-	-	-	-	-	-	-	-	BS	PR	1	-	-	13
46.	Chiktan	-	1	2	-	-	-	-	1	-	-	-	1	-	-	BS	PR	1	-	-	12
47.	Kuksho	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-	KR	1	-	-	4
48.	Samray	-	2	1	-	-	-	-	-	-	-	-	-	-	-	-	PR	SP1	-	-	9
49.	Stakste	-	3	-	-	-	-	-	-	-	-	1	-	-	-	-	PR	1	-	-	7
50.	Bodhkharbu	-	1	1	-	-	-	-	-	-	-	-	1	-	-	BS	PR	1	-	-	9
51.	Hinkau	-	1	-	-	-	-	-	-	-	-	-	-	-	-	BS	PR	1	-	-	6
52.	Lamsusund	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	FP	SP1	-	-	4
53.	Sanjak	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	SP1	1	-	3

S. No.	Name of the village	Education					Medical						P&T Commun			Tpt		Drinking water			C.I.
		Basic	Pr. Sch.	Middle Sch.	High Sch.	Hr. Sec.	MAC/ Amchi	Disp.	PHC	Hosp.	Others	Other med. cent	Post Off.	P&T Off.	Tel.	Bus Stand	Rd.	N	River	Tap water	
54.	Yogmakharbu	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	FP	SP1	-	-	3
55.	Kukste	-	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	7
56.	Pushkum	-	3	-	-	-	-	1	-	-	-	-	1	-	-	-	PR	1	1	1	12
57.	Lochum	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-	PR	1	-	-	5
58.	Darket	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	PR	1	-	-	4
59.	Nunamche	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	FP	1	-	-	3
60.	Shergol	-	1	-	-	-	-	-	-	-	-	-	-	-	-	BS	FP	1	-	-	5
61.	Malbak	1	3	1	-	-	-	1	-	-	-	-	1	-	-	BS	PR	1	-	-	14
62.	Vakhah	-	4	1	1	-	-	-	-	-	-	-	-	-	-	BS	PR	1	-	-	15
63.	Tache	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-	FP	1	-	-	4
64.	Karit	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	FP	1	-	-	6
65.	Khache	-	1	1	-	-	-	-	-	-	-	1	-	-	-	-	KR	1	-	-	5
66.	Phuh	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	KR	1	-	-	3
67.	Karamba	-	1	1	1	1	-	-	-	-	-	-	-	-	-	-	KR	1	-	-	5
68.	Tingdo	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	KR	1	-	-	3
69.	Skambo	-	1	2	-	-	-	-	-	-	-	-	-	-	-	-	KR	SP1	-	-	5
70.	Stakpa	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	SP1	-	-	3
71.	Umba	-	2	-	-	-	-	-	-	-	-	1	1	-	-	-	FP	SP1	-	-	7

S. No.	Name of the village	Education					Medical						P&T Commun			Tpt		Drinking water			C.
		Basic	Pr. Sch.	Middle Sch.	High Sch.	Hr. Sec.	MAC/ Amchi	Disp.	PHC	Hosp.	Others	Other med. cent	Post Off.	P&T Off.	Tel.	Bus Stand	Rd.	N	River	Tap water	
72.	Nagmakusara	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	FP	SP1	-	-	7
73.	Lankarche	-	1	-	-	-	-	-	-	-	-	-	1	-	-	BS	PR	1	-	-	7
74.	Farona	-	1	-	-	-	-	-	-	-	-	-	-	-	-	BS	PR	1	-	-	7
75.	Saleskot	-	1	1	-	-	-	-	-	-	-	1	1	-	-	-	PR	1	-	1	11
76.	Tringspon	-	1	1	-	-	-	1	-	-	-	-	1	-	-	BS	PR	1	-	-	16
77.	Kanor	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	KR	1	-	-	3
78.	Tambis	-	1	-	-	-	-	1	-	-	-	-	1	-	-	-	KR	1	-	-	6
79.	Gundmangalpur	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	PR	-	1	-	4
80.	Thangdumru.	1	4	-	1	-	-	-	1	-	-	-	1	-	-	-	PR	1	1	-	14
81.	Khaasgamthwe-na	-	3	-	1	-	-	-	-	-	-	1	1	-	-	BS	PR	-	1	-	10
82.	Sangroh	-	2	1	-	-	-	-	-	-	-	1	1	-	-	BS	KR	1	-	-	9
83.	Barso	-	4	1	-	-	-	-	-	-	-	1	1	-	-	BS	PR	1	-	1	14
84.	Bartu	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	KR	1	-	-	3
85.	Shergandi	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	KR	1	-	-	3
86.	Ichu	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	KR	1	-	-	3
87.	Khandi	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	KR	1	-	-	3

V·1

S.No.	Name of the village	Education					Medical						P&T Commun.			Tpt		Drinking water			C.I.
		Basic	Pr. Sch.	Middle Sch.	High Sch.	Hr. Sec	MAC/ Amchi	Disp.	PHC	Hosp.	Others	Other med. cent.	Post Off.	P&T Off.	Tel	Bus Stand	Rd	N	River	Tap water	
101	Yuljuk	-	2	-	-	-	-	-	-	-	-	1	1	-	-	BS	PR	1	-	-	9
102.	Purtikche	-	2	-	-	-	-	-	-	-	-	-	1	-	-	BS	PR	1	-	-	9
103.	Gyaling	-	1	-	-	-	-	-	-	-	-	-	-	-	-	BS	PR	-	1	-	7
104.	Karpokhar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	BS	PR	1	-	-	6
105.	Rangdom	-	1	-	-	-	-	-	-	-	-	1	1	-	-	BS	PR	1	-	-	7

The weightage given to these socio-economic amenities have been explained in Chapter-V.

B.A.C - Basic Activities School, Pr.Sch - Primary School, Middle Sch.-Middle School, High Sch. - High School, Hr.Sec. -Higher Secondary School, MAC - Medical Aid Centre, Disp.- Dispensary, PHC - Primary Health Centre, Hosp.-Hospital, Other med.Cent.-Other Medical centre - TB Clinic, Family Planning Centre, Post Off.-Post Office , P&T - Post & Telegraph, Tel.-Telephone , Rd.-Road, N-Nallah , C.I. - Composite Index.

APPENDIX - V.2

Scale Free Values and Composite Index

S.No.	Name of village	Population size	Growth rate	Sex ratio	Amenities	Total Literacy	Female literacy	Non agricultural labourer	Composite Index (3+4+5+....+9)
1	2	3	4	5	6	7	8	9	10
1.	Kargil	6.643	2.141	1.135	6.75	2.150	4.20	3.006	26.027
2.	HARIPORO	-	-	-	-	-	-	-	-
3.	TRANKUCHAN	.811	.887	1.023	.423	1.352	.469	2.185	7.151
4.	MATAYAN	.540	1.479	.989	1.128	1.160	.687	3.865	9.851
5.	PANDRAS	.719	.064	1.236	1.410	1.771	2.87	3.171	9.083
6.	BATOKUL	-	-	-	-	-	-	-	-
7.	MUSHKU	.480	- .501	.909	.987	1.183	2.795	1.307	8.165
8.	HULYAL	.580	1.251	1.074	.423	1.149	.589	1.839	6.906
9.	MURADBAGH	.625	1.012	.775	1.128	1.725	.306	1.249	6.822
10.	GOSHAN	1.171	1.010	1.068	1.410	0.945	1.362	1.230	8.199
11.	RAMBIRPUR	1.124	1.151	.915	2.116	2.042	.151	3.338	12.207
12.	GINDIAL	.459	1.219	1.069	.846	1.386	2.748	1.537	9.266
13.	BIMBAT	1.079	1.555	.976	1.269	1.399	0	1.524	7.796
14.	THRANGOS	.395	.396	1.139	.705	1.536	1.655	1.150	6.978
15.	CHOKIAL	.749	.379	1.233	1.128	2.207	.217	.760	5.566
16.	JUSGUND	2.397	1.289	1.087	.564	1.184	1.326	1.207	7.055
17.	THASGAM	.314	.110	1.094	.705	1.149	.444	1.003	5.168
18.	KAKSAR	.710	-.431	1.142	1.692	1.118	1.678	.175	5.949
19.	KHARBU	.855	.792	.806	1.410	1.719	.482	1.724	8.291
20.	SHIMSHA	.548	.823	.951	1.218	1.467	.487	1.307	5.625

(Contd.)

S.No.	Name of Village	Population Size	Growth rate	Sex ratio	Amenities	Total literacy	Female literacy	Non agricultural labourer	Composite Index (3+4+5+.....+9)
1	2	3	4	5	6	7	8	9	10
21.	YIBU	.766	1.152	.832	.423	1.611	.453	.753	5.993
22.	SHILIKCHE	1.226	3.354	.926	.987	1.238	.519	1.095	9.349
23.	POEN	1.548	2.725	.960	.846	1.399	.931	1.005	9.416
24.	PARTAPGANG	.297	1.525	.832	.564	1.713	.294	1.264	6.492
25.	AKCHAMAL	1.783	.991	.894	1.551	1.297	.668	1.207	8.395
26.	TOUMEL	.864	.585	1.176	.987	0.737	2.748	.545	6.644
27.	YOUR BALTAK	2.083	1.590	.902	.846	0.346	.328	.804	6.401
28.	APATI	1.118	1.374	1.022	.423	1.498	0	.434	4.872
29.	LALUNG	.787	.202	1.034	.423	0.149	.278	.064	3.523
30.	SILMO	1.603	1.474	.937	1.410	1.270	.324	1.121	8.141
31.	CHULICHAN	.835	-.583	1.125	.564	0.728	0	.481	4.318
32.	DERCHIKS	.574	.298	.874	.705	0.546	1.192	.132	4.324
33.	GARKON	.817	.149	.983	.564	0.336	.691	.175	3.718
34.	KARKIT	1.755	2.297	1.094	1.692	0.625	.340	.204	8.010
35.	PHULTUKS	.171	1.704	1.355	.423	0.841	1.850	.871	7.227
36.	HARDAS	1.230	1.273	1.030	1.269	0.884	.995	.422	7.105
37.	BATAMBIS	.346	.321	.937	.423	0.676	8.571	.513	11.986
38.	MINJI	1.927	.731	.987	2.116	2.027	6.625	1.118	19 .336

(Contd.)

S.No.	Name of village	Population size	Groth rate	Sex ratio	Amenities	Total literacy	Female literacy	Non agricul-tural labourer	Composite Index (3+4+5+...+9)
1	2	3	4	5	6	7	8	9	10
39	BAROO	2.176	.627	1.009	2.398	2.028	6.626	1.111	13.816
40.	CHULISKAMBO	.791	.707	1.265	.705	..870	10.027	.162	14.488
41.	CHOSKAR	2.483	.776	.971	1.411	1.007	.038	.838	9.808
42.	SAFI	.900	.378	1.032	.846	.391	.401	.617	4.568
43.	BARCHE	.597	.402	.954	.564	.492	.156	.394	8.761
44.	SHAKAR	2.386	1.322	.987	1.834	.911	.283	.907	8.611
45.	HAKNIS	1.669	1.337	1.018	1.834	2.132	.655	1.198	9.845
46.	CHIKTAN	1.307	1.158	1.115	1.692	1.079	.932	2.518	6.006
47.	KUKSHO	.806	.691	.953	.564	.230	.351	.217	3.814
48.	SAMRAY	1.428	1.242	.915	1.269	1.291	1.317	.798	8.261
49.	STAKSE	1.652	1.035	.926	.988	1.199	.465	1.280	7.544
50.	BODHKHARBU	1.326	1.749	.883	1.269	.783	.893	1.008	7.912
51.	MINAKU	.359	.497	1.126	.846	.627	.964	.454	5.874
52.	SANJAK	.510	3.797	.979	.423	1.306	.914	.819	8.748
53.	YOGAKHARBU	.685	1.612	1.432	.423	1.172	1.578	.411	7.315
54.	LAMSUSAND	.651	.707	1.121	.564	.542	0	.169	3.575

(Contd)

S.No.	Name of village	Population size	Growth rate	Sex ratio	Amenities	Total literacy	Female literacy	Non agricultural labourer	Composite Index (3+4+5+...+9)
1	2	3	4	5	6	7	8	9	10
55.	KUKSTE	.352	.726	1.252	.987	.694	.179	.836	5.028
56.	PUSHKUM	3.030	1.549	1.024	1.692	1.099	0	1.534	9.931
57.	LOCHUM	.408	1.382	1.193	.705	.911	1.079	.322	6.003
58.	DARKET	.243	1.081	1.108	.564	.791	.707	.951	5.444
59.	NUNAMCHE	.263	1.506	.978	.433	1.532	4.283	.937	9.919
60.	SHERGOL	.486	1.136	1.125	.705	2.179	2.875	.981	9.668
61.	MALBEK	1.726	1.275	.943	1.975	1.553	2.408	1.084	10.962
62.	WAKHA	1.897	.792	1.058	2.116	1.518	0	.920	6.542
63.	TACHE	.489	1.038	.761	.564	.980	.195	.975	5.005
64.	KARIT	.463	0.036	1.035	.846	.549	.589	.537	4.058
65.	KHACHE	.591	.913	1.048	.705	1.160	.271	.325	4.976
66.	PHUH	.799	.844	.998	.423	.515	.464	3.924	7.969
67.	KARAMBA	.378	.758	.923	.705	.699	.154	.398	3.917
68.	TINGDO	.339	.759	1.357	.423	.809	0	1.308	4.997

S.No.	Name of village	Population size	Growth rate	Sex ratio	Amenities	Total literacy	Female literacy	Non agricul-tural labourer	Composite Index (3+4+5+...+9)
1	2	3	4	5	6	7	8	9	10
69.	SKAMBO	.597	1.072	.979	.705	1.050	.186	.222	4.804
70.	STAKPA	.872	.983	.852	.423	.764	0	.233	3.728
71.	UMBA	.979	1.911	1.003	.987	.801	0	2.201	7.883
72.	NAGMAKUSARA	.964	.299	1.108	.705	.457	0	.104	3.639
73.	LANKARCHE	2.328	..598	.922	.987	.412	.045	.525	5.818
74.	PARONA	.832	.626	1.051	.987	.729	.099	.726	5.053
75.	SALESKOT	1.979	1.178	1.010	1.551	.752	.278	1.078	7.830
76.	TRINGSPON	2.682	.858	1.031	2.257	.358	.167	.598	7.953
77.	KANOR	1.282	1.641	1.060	.433	.756	0	.830	6.004
78.	TAMBIS	2.202	1.249	.993	.846	.629	.653	.723	7.294
79.	GUND MANGALPUR	1.750	.732	.958	.564	.728	.149	.717	5.599
80.	THANGDOMRU	2.616	.819	.950	1.975	.988	.925	1.020	9.296
81.	KHAASGAM THVEVNA	2.482	.776	.970	1.410	.528	.054	.454	6.679
82.	SANGROH	1.237	.511	.804	1.269	.926	.274	1.139	6.162

S.No.	Name of village	Population size	Growth rate	Sex ratio	Amenities	Total literacy	Female literacy	Non agricul-tural labourer	Composite Index (3+4+5+...+9)
1	2	3	4	5	6	7	8	9	10
83.	BARSO	1.746	1.222	.896	1.975	1.027	0	.524	7.392
84.	BARTU	.655	.232	1.034	.423	.437	0	.289	3.069
85.	SHERGANDI	.265	.700	1.022	.423	.221	.058	.120	2.834
86.	ICHU	.088	-.509	.721	.423	.996	0	.170	2.909
87.	KHANDI	1.476	.813	.960	.423	.564	0	.354	4.592
88.	KARCHEKHAR	1.032	.637	.826	.564	.683	.106	.640	4.491
89.	KHANS	.710	.579	1.017	.564	.621	0	.321	3.813
90.	NAMSURU	.934	1.452	.866	.987	.765	.702	1.115	6.824
91.	THULSPURSA	.371	.745	1.038	.423	.503	0	.180	3.262
92.	TESURU	.533	.617	.842	1.128	1.507	.560	3.924	9.113
93.	PARKACHIK	1.209	1.301	.639	1.551	.275	0	.675	5.653
94.	KOCHIK	.310	.585	1.119	.705	1.419	0	.280	4.421
95.	TANGOL	.685	.463	1.040	.846	.743	0	.252	4.031
96.	ACHAMEUR	.482	1.829	1.074	.846	.731	3.212	.583	5.869

S.No.	Name of village	Population size	Growth rate	Sex ratio	Amenities	Total literacy	Female literacy	Non agri-cultural labourer	Composite Index (3+4+5+..+9)
1	2	3	4	5	6	7	8	9	10
97.	CHOSKAR	.401	.972	.989	.846	.635	3.063	3.052	7.203
98.	PRANTI	.606	1.940	1.175	.705	1.842	.478	1.411	8.160
99.	PANIKHAR	.293	.762	1.047	2.116	1.934	.283	3.809	10.246
100.	KARGI	.617	2.607	.886	1.128	.666	.090	.568	6.565
101	YULJUK	1.320	.828	.963	1.269	.697	0	1.025	6.105
102.	PURTIKCHE	1.102	.916	.843	1.269	1.120	.070	1.425	6.797
103.	GYALING	.297	1.855	.997	.987	.263	0	1.652	6.054
104.	KARPOKHAR	.160	2.330	.701	.846	.489	.070	.201	4.800
105.	RANGDOM	.325	.760	.867	.987	.721	0	1.066	4.729

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