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Habitat conditions and settlement processes in the Hindukush – Karakoram

12 figures in the text

Zusammenfassung:
Umweltbedingungen und Siedlungsprozesse im Hindukusch – Karakorum

Die Frage der Siedlungsgrenzen im Hochgebirge wird im Hinblick auf die Beziehungen zwischen Naturkatastrophen und Siedlungsprozessen diskutiert. Angesichts einer wachsenden Bevölkerung in Hochgebirgen der dritten Welt und damit verbundener Ausweitungen des Siedlungsraumes treten Schutzüberlegungen bei der Wahl von und der Bedarf an Wohn- und Wirtschaftszonen in Konkurrenz. In Fallbeispielen aus dem Hindukusch und Karakorum wird das Spektrum von dort auftretenden Umweltereignissen historisch detailgetreu nachgezeichnet und hinsichtlich ihrer Schadenswirkung auf die anthropogene Infrastruktur bewertet. Zwei Talschaften wurden dafür ausgewählt, die unterschiedliche Besiedlungsabläufe widerspiegeln und für das Untersuchungsgebiet im innerasiatischen Hochgebirgsgürtel charakteristische Siedlungsstrukturen repräsentieren. Die Anlage von Bewässerungsoasen und eine nachhaltige Bewirtschaftung sind nur in Schutzlagen auf eng begrenztem Raum möglich. Die Inwertsetzung dieser Nischen in kleingekammerten Talschaften und damit verbundene Anpassungsstrategien unterliegen Steuerungsprozessen, die durch politisch-historische und sozioökonomische Rahmenbedingungen gekennzeichnet sind. Auf der einen Seite existieren Talschaften, die über eine lang etablierte Kernbevölkerung und damit verknüpfte traditionelle Herrschaftsinstitutionen verfügen. Diese potentiell weitgehend erschlossenen Regionen weisen ein vergleichsweise stetiges Bevölkerungswachstum auf. Auf der anderen Seite gibt es weiterhin Erschließungsgebiete, die als Peripherien von Fürstentümern Zielregionen von Migranten auf der Suche nach land- und weidewirtschaftlich in Kultur zu nehmenden Ressourcen wurden. Heute weisen sie eine stark heterogene Bevölkerungszusammensetzung auf und sind vor allem durch extrem hohe Zuwachsraten gekennzeichnet. Der Versorgungsbedarf der wachsenden Residenzbevölkerung im Untersuchungsgebiet kann schon heute nur noch partiell aus den Bergregionen befriedigt werden.

Резюме:
Условия окружающей среды и процессы расселения в Гиндукуше — Каракоруме

Вопрос о границах заселения в высокогорье обсуждается относительно связей между стихийными бедствиями и процессами расселения. Ввиду роста населения в высокогорных районах третьего мира и связанного с этим расширения заселённой территории соображения об охране при выборе и потребность в жилых и хозяйственных зонах вступают в конкуренцию. С помощью отдельных примеров из Гиндукуша и Каракорума автор, точно передавая исторические детали, обрисовывает спектр встречающихся там в окружающей среде событий и оценивает последние относительно ущерба, нанесённого ими антропогенной инфраструктуре. Для этого были выбраны две долины, отражающие разные процессы заселения и представляющие собой характерные для района исследования во внутриазиатском высокогорном поясе структуры поселения. Сооружение орошаемых оазисов и их продолжительное использование возможны только в защитных местоположениях на ограниченном отрезке территории. Развитие этих ниш в долинах с мелкими ячейками и связанные с этим стратегии приспособления подлежат процессам управления, которые характеризуются общими политико-историческими и социально-экономическими условиями. С одной стороны существуют долины, обладающие уже давно поселившимся коренным населением и связанными с этим традиционными органами власти. Эти потенциально широко освоенные регионы показывают относительно постоянный рост населения. С другой стороны продолжают существовать районы освоения, которые как окраины княжеств стали целевыми регионами мигрантов, ищущих ресурсы для сельскохозяйственного и пастбищного использования. Последние представляют сегодня сильно гетерогенный состав населения и характеризуются прежде всего чрезвычайно высоким уровнем прироста. Потребность в снабжении растущего населения в районе исследования уже теперь только частично может покрываться из горных регионов.

Summary:

The impact of natural hazards on settlement processes in high mountain habitats is discussed in view of montane settlement frontiers and their relationship to population growth in Third World societies. Mountain habitats tend to expand into peripheral regions where safety measures compete with the demand for additional living and dwelling space. In case studies from the Hindukush and Karakoram the range of natural hazards is documented and classified. An evaluation of historical evidence from records and oral traditions shows the impact of natural hazards on settlements and their destruction of man-made infrastructure. Two valley societies have been selected to present different forms of settlement processes. Both stand for specific settlement structures in the study area of the Inner Asian high mountain arc. The establishment of irrigation oases and their sustainable cultivation is limited to protected areas of finite extent. Processes which are characterized by historico-political and socio-economic conditions execute a systems control on the utilization of these narrow niches in differentiated valley bottoms and connected adaptation strategies. On the one hand their exist valley societies that are composed of a long-established nuclear population. In those societies hereditary rule and traditional institutions hold a strong position. The agricultural potential of these regions has been cultivated and meliorated to a high degree; population growth is rather steady. On the other hand there remain developable regions that have been the peripheries

of principalities or local institutions. These virgin or underutilized areas represent prominent targets for migrants in search of grazing and cultivable lands. Presently they resemble a heterogeneous population structure. Valleys and villages are characterized by extraordinary high population growth rates. All valley societies within the study area suffer from agricultural production deficits, thus increasing the dependence on external supplies from lowland regions.

1. Introduction

The discussion of risk conditions, environmental and socio-economic vulnerability of ecosystems has been focussing on regions at the settlement frontiers. The phenomenon of expanding deserts and the overall loss of habitable space within the ecumene on the one hand and the cultivation of virgin lands on the other hand characterize shifts in settlement areas on a global scale (cf. EHLERS 1984). In the third dimension, i. e. adding the altitudinal scale to the focus, there occur limitations for human habitations posed by environmental conditions such as ice and glacier cover, water availability, bio-physical potential and spatial distribution of cultivable lands and pastures. These basic frame conditions for settlements are locally specified through a set of short-lived events, commonly described as natural and man-made hazards which are responsible for the classification of high mountain areas as regions of disasters (cf. HEWITT 1992). The recent discussion of environmental deterioration in these habitats[1] has led to the assumption that mountains offer a decreasing space for human settlements. Contrary to these limitations the population figures in mountain regions of the Third World register growing numbers of residents in spite of increasing emigration. The regional dissimilarities in population density between different subregions of the High Asian mountain belt are remarkable, and in comparison with the average of the neighbouring Himalayan system (54.2 inhabitants per km^2) the Northern Areas of Pakistan in the Karakoram – Hindukush belt with 8.8 inhabitants per km^2 represent rather sparsely populated mountain regions. These figures have to be evaluated in perspective of the availability of resources and settlement potential. A low population density indicates difficult conditions of resource utilization in scattered habitations and probably a comparatively young settlement history or episodic disaster events which limited a steady population growth.

In this paper it is attempted to persecute the question of settlement developments in the Hindukush – Karakoram from the perspective of ecological and socio-economic constraints presenting evidence from archival sources and fieldwork in the region. Two valleys have been selected for investigation which are perceived as two models of settlement processes. Their exposure to environmental threat followed different lines, and they represent two types of social and historical developments characteristic for all valley societies in the Hindukush – Karakoram region.

2. Structural elements of settlement

The mountain belt of Eastern Hindukush, Karakoram and Western Himalaya features a settlement pattern which is characterized by permanent human habitations in the arid valley bottoms and seasonal abodes in semi-arid to sub-humid ecological zones of higher altitudes. While crop-raising dominates the traditional economic activities in the low-lying villages, a shift towards animal husbandry occurs in the higher elevations. This system of a mixed mountain agriculture forms the basis of human exploitation of natural resources in these mountain regions.

The selection of permanent settlement sites in the scattered oases has been governed by different factors: First of all, water availability for irrigated agriculture and human consumption is an important precondition as well as the provision of flat or terraceable land in a safe location. The combination of these two factors identifies glacio-fluvial terraces, alluvial fans and debris cones at the confluence of tributaries with main rivers as convenient sites in this environment.[2] High relief energy and the extreme variation of climate and vegetation with altitude are characteristic features with mighty water towers of ice in the upper storey, intermediate zones of transition with variable vegetation cover, and desert-like conditions in the valley bottoms. The irrigation oases depend on the water storage capacity of the nival zone from where meltwater is tapped through a system of gravity-fed

[1] An extensive survey of research methods and applied models of interpretation has been presented by IVES & MESSERLI (1989) who criticize previous approaches and present case studies from Nepal, cf. in this connection the recently (re-) published compendium by MESSERLI, HOFER & WYMANN (1993) containing the results of 12 years of research. A special section of the International Karakoram Project (MILLER 1984) was devoted to housing and natural hazards. STONE (1992) summarizes in a more generalizing account the "state of the world's mountains".

[2] For the general geomorphic and glaciological description of the Hindukush – Karakoram region cf. HASERODT (1989), HEWITT (1989), GOUDIE et al. (1984). There the key features of climatic gradients, extent of glaciated area, glacier movements etc. are presented.

canals.[3] High above the hazard-prone flood plains of the main rivers, which often cannot be tapped for irrigation purposes, the majority of habitations are to be found and comprise the valued settlement zones of the valleys.[4]

On a regional scale areas at lower elevations were preferred for early settlements, as the growing periods for crops are longer and allow double-cropping. Archaeological and etymological evidence supports the hypothesis of a gradual shift of settlements from the main river valleys into the side-valleys several centuries ago (BERGER 1960; BUDDRUSS 1985; JETTMAR 1961, 1989, 1993).

The present-day settlement patterns in the study area comprise isolated and scattered oases of different sizes in favourable locations as well as contiguous villages which form a linear chain of cultivated lands on river terraces. The altitudinal zone of permanent settlement ranges from 1,400 m in the lowest valley bottoms up to 3,500 m in the headwaters of tributary rivers. Nowadays the vast majority of these villages are accessible by jeepable road, an achievement which distinguishes the mountain areas of Pakistan and India from neighbouring countries.

As a rule seasonal settlements lack road access and are scattered in the artemisia steppe. They are located in close neighbourhood to high pastures where the herds of yaks, oxen, sheep and goats as well as donkeys are kept during summers. From the permanent villages these outposts are approached on foot; all equipment and products have to be carried by porters and/or donkeys or yaks. Two different types of these seasonal abodes might be distinguished. The larger ones are summer settlements of several houses where crops are cultivated in addition to livestock-keeping, while in higher elevations a few huts and a stone-walled pen form the base for animal husbandry which prevails there as a single activity.[5] Distances between permanent and seasonal habitations range from a few hours' walk to three-day-long marches in an altitudinal range up to 4,200 m with a few exceptional camps above that level. With altitude the density of population decreases in the seasonal as well as in the permanent settlement regions. The population centres remain concentrated in the lower river valleys.

For an explanation of the genesis of the overall habitational structure certain aspects have to be elaborated on:

- How do ecological conditions affect these settlement patterns?
- What is the impact of natural hazards and disasters on settlement sites?
- How does population growth influence the extension of settlements and the selection of sites?
- What impact poses intra- and extra-montane migration on the settlement structure?

In pursuit of these questions a two-fold approach is followed: first of all, the record of catastrophic natural events is analysed with emphasis put on the effects of disasters on existing settlements. In a second step evidence from two valleys is presented in case studies discussing population growth, the establishment of filial settlements within the valley, intra- and extra-montane migration processes. The historical reconstruction is based on the recording of genealogical affiliations of residential groups and on evidence provided by the classification of irrigation networks relating to the period of their construction.

3. Hindukush – Karakoram: limitations in a region of natural disasters

Different approaches have been followed to map and analyse catastrophic events in the Karakoram. In the Hunza Valley geomorphologists of the International Karakoram Project surveyed the region between Gilgit and Gulmit along the Karakoram Highway in 1980 and identified traces of 339 disastrous incidents (GOUDIE 1981, p. 312). Recent research has been conducted by members of the CAK project investigating a comprehensive set of disasters while interviewing households in the project area about their experiences with natural hazards (MOHAMMAD SAID 1991, 1992). Thus a wide range of short-lived mass movements as well as earthquake related destruction have been identified.

For the purpose of relating damages caused by natural disasters with settlement processes, the risk conditions for human dwellings and the impact of these events on habitations are of prime interest for judging the potential and actual vulnerability. Consequently it has been attempted to record damaging events in the case study areas of the Hunza and Ishkoman valleys and to evaluate their influence on settlement patterns.

[3] Only in a few cases main rivers are tapped for irrigation purposes (e. g. in Jutal oasis, Gilgit Subdivision). Communicating tubes have been constructed across the Hunza river to supply Nasirabad (Hindi) with surplus water from Pissan in Nager. In 1991 experiments with sprinkler irrigation have been started on selected testing sites in Ghalapan and Ahmedabad.

[4] The vertical distance between the river bed and the irrigated oasis can measure up to 100 m which makes it unfeasible for traditional irrigation systems to utilize the river waters in the village. Instead tributaries are tapped to supply gravity-fed canal irrigation networks. Only in recent years lift irrigation has been introduced in some areas: diesel-engine driven pumps lift up water to the water-deficient areas of Gilgit Town and Zulfiqar Colony.

[5] Cf. KREUTZMANN (1989, p. 134, Fig. 36), SENARCLENS DE GRANCY (1980, p. 125); STÖBER (1993, pp. 60, 93) for groundplans of such settlements.

Fig. 1 Inventory of natural hazard events in the Hunza Valley 1830–1993

Year	Event	Locality of event	Remark/Extent of damage	Source/Reference
1830	G/M	Chupursan	damage to all settlements in Chupursan	SCHOMBERG (1935, p. 225; 1936)
1858	R	Sarat	loss of village lands due to undercutting of terrace; flooding of all villages from Sarat to Pasu	DREW (1875, p. 419), N. N. (1928, p. 182), PAFFEN et al. (1956, p. 14)
1873	G	Batura	damage to buildings at Pasu and Matum Das	MASON (1929, pp. 20-21)
1884	G	Shimshal	damage to terraces at Ganesh	TODD (1930, p. 174)
1890	G	Nomal-Gilgit	route destroyed by flood	IOL/P & S/7/63, p. 498
1892	G	Nomal-Chalt	all bridges destroyed, road damaged	IOL/P & S/7/67, p. 701
1893	M	Matumdas	mudflow destroys irrigation channel and settlement	SINGH (1917, p. 27)
	G	Shimshal	damage to terraces at Altit	MASON (1929, p. 21)
1894	M	Hispar		CONWAY (1894, p. 323)
	T	Baltit	damage due to rainfall, channels destroyed	IOL/P & S/7/75
	T	Sumayar	jhula (ferry) carried away	IOL/P & S/7/75
	T	Ghujal	several jhula and bridges destroyed	IOL/P & S/7/75
	T	Ratal	destruction of hamlet, all channels and fields; 23 persons killed	IOL/P & S/7/75
	G	Hasanabad	bridge destroyed	IOL/P & S/7/76
1895	G	Ganesh	loss of cultivation at Shamets	IOL/P & S/7/81; PRO/FO65/1506, p. 282
1897	A	Hakuchar, Chalt	river block; damage to terraces, orch. and tracks	IOL/P & S/7/92/539
	A	Nilt	avalanche kills two women	IOL/P & S/7/92/539
	G	Barpu	forming of a lake	IOL/P & S/7/92/539
1899	G	Hasanabad	bridge destroyed	IOL/P & S/7/115/803
1900	G	Nilt	bridge destroyed	IOL/P & S/7/126/967
1901	R/M	Chalt	Nomal-Chalt track destroyed	IOL/P & S/7/134/821
	G	Shimshal	breaking of a dam	IOL/P & S/7/135/903
	G	Shimshal	bridge at Ganesh destroyed	IOL/P & S/7/136/1021
	G	Hasanabad	damage to bridge	IOL/P & S/7/136/1009
1902	G	Hasanabad	damage to bridge	IOL/P & S/7/145/886
	G	Hasanabad	bridge destroyed	IOL/P & S/7/146/1051
	G	Hasanabad	glacier advance of two miles within 50 days	IOL/P & S/7/145/856
1903	G	Hasanabad	glacier surge (30 m), destruction of canal	IOL/P & S/7/152/468
	A	Miachar	avalanche blocks road	IOL/P & S/7/154/789
1904	G	Ahmedabad	glacier surge, destruction of canals	IOL/P & S/7/165/1025
	G	Hasanabad	glacier surge, destruction of canals	IOL/P & S/7/165/1094
	G	Khurdopin	damage to terraces at Shimshal after emptying of two-year-old lake (1902)	BRIDGES (1930, p. 172), IOL/P & S/7/167/1319
1905	R/M	Hasanabad	two flocks of goats covered by rocks and mudslide	IOL/P & S/7/181/1586
	G	Malungutti, Khurdopin	damage to Chalt Bridge and Gilgit-Chalt track destroyed; loss of fields at Pasu and Shimshal	IOR/2/1084/289, p. 153; IOL/P & S/7/180/1426; TODD (1930, p. 174)
	G	Shimshal	damage of 7 houses at Shamets and to Hunza-Nager bridge at Ganesh	NEVE (1913, pp. 164-165)
1906	G	Shimshal	damage to bridges at Askurdas, Tashot and Chamogah	IOL/P & S/7/192/1618, MASON (1929, p. 21), TODD (1930, p. 175)
1906	G	Shimshal	fields, houses and bridges destroyed at Pasu, Hussaini, Gulmit, Ganesh	SINGH (1917, p. 7), IOL/P & S/7/193/1654
	G	Shimshal	3 houses, 35 fields and 3 watermills and orchards destroyed	IOL/P & S/7/193/1654
	T	Nomal	road destroyed, 1 woman and livestock killed	IOL/P & S/7/193/1654
1907	G	Khurdopin	local alert system proves successful	TODD (1930, p. 175)
1908	T	Minapin/Miachar	damage to road and bridges	IOL/P & S/7/221/1898
1910	W	Sikandarabad	new bridge destroyed by high winds	IOL/P & S/7/238/723
	R	Shayar	Shayar bridge destroyed	IOL/P & S/7/241/1050
	G	Ahmedabad	Gurpi glacier advance, loss of irrigation channels' heads	IOL/P & S/7/243/1477, p. 6
	G	Batura, Pasu	damage to 3 houses, 20 terraces and fruit trees	IOL/P & S/7/241/1118
	G	Sikandarabad	bridge carried away	IOL/P & S/7/243/1477
1913	G	Hassanabad		IOL/P & S/10/826, p. 199

Fig. 1 (Continuation)

Year	Event	Locality of event	Remark/Extent of damage	Source/Reference
1914	G		bridge destroyed	IOL/P & S/10/826, p. 179
1922	G	Shimshal	loss of farms at Shimshal	IOL/P & S/10/973, p. 226; VISSER & VISSER-HOOFT (1935, p. 48)
1923	G	Shimshal		IOL/P & S/10/973, pp. 188, 191
1925	A/R/W	Minapin	pressure wave destroyed all fruit trees at Minapin	IOL/P & S/10/973, p. 126
1927	G	Khurdopin	damage to bridges and farms at Shimshal	MASON (1929, p. 22), MORRIS (1928, p. 525), TODD (1930, p. 175)
1934	G		damage to cultivated lands at Shamets (Ganesh)	Local knowledge
1935	R	Pheker	damage to terraces at Pheker and Hakuchar	FELMY (1986, p. 19)
1937			damage to bridges at Chalt	IOL/P & S/12/3288, p. 7
	R	Pheker	damage to bridges at Tashot	IOL/P & S/12/3285
1941	G	Shimshal		CHARLES (1985, p. 369)
1944	G	Shimshal	damage to terraces at Pasu	SAUNDERS (1983, p. 107)
1947	R		stone avalanche destroys flock	GYR (1949, p. 68)
	M	Nomal	Gilgit – Chalt track damaged	GYR (1949, p. 72)
1957	G	Shimshal		CHARLES (1985, p. 369)
1959	G	Shimshal	damage to irrigation channel at Nomal	FINSTERWALDER (1960), REPP (1963, p. 209)
1960	G	Shimshal	damage to bridge at Pasu	CLARK (1960, p. 22)
	R	Maiun	damage to orchards	Local knowledge
1960–64	G	Khurdopin	loss of farms and terraces at Shimshal in consecutive years	Local knowledge
1962	G	Shimshal	damage to bridge at Pasu	Local knowledge
1972	G/M	Batura	damage to bridge	GOUDIE et al. (1984, p. 389)
1973	M	Momhill	damage to bridge	KAMAL (1979, p. 24)
1974	M	Balt Bar	damage to bridge	WENYING et al. (1984, p. 76)
	G	Batura	damage to bridge	GOUDIE et al. (1981, p. 310)
1974–93	A	Gulmit	annually covering/blocking of KKH with snow/ice	Own observation and confirmation
1975	G	Balt Bar	damage to bridge	SALAMAT ALI (1977, p. 66)
	M	Batura	damage to bridge	GOUDIE et al. (1984, p. 389)
1976	M	Shishket	damage to bridge	GOUDIE et al. (1984, p. 389)
1977		Shishket		SAUNDERS (1983 a, p. 107)
1978	G	Shimshal	damage to terraces at Pasu	GOUDIE et al. (1984, p. 389)
1980	G	Ghulkin	damage to KKH	GOUDIE (1981, p. 310)
1983	R	Atabad	damage to irrigation channel at Atabad	SAUNDERS (1983)
1986	G	Ghulkin	damage to KKH	Own observation
1988	A	Jaglot	snow avalanche blocking KKH	Own observation
1990	M	Sarat	blocking of KKH	Own observation
	R	Multanza	rockfall killing traveller	Own observation
	A/M/R	Jaglot	blocking of KKH	Own observation
1991	A/M/R	Jaglot	blocking of KKH	Own observation
1992	A/M/R/T	Gilgit-Sost	blocking of KKH at several places after heavy rains and snowfall	Local information
	M/R/T	Hunza	destruction of bridges and paths	Local information
	T	Shimshal	damage to pasture settlements and village lands	Local information
	A/M	Chupursan	damage to pasture settlements and village lands	Local information
1993	M	Murtazabad	blocking of KKH	Own observation

Abbreviations:
A = Snow avalanche
G = damage caused by outburst floods from glacial barrages. These barrages are formed by glacier advances blocking a valley and thus creating lakes of different sizes which eventually feed and propagate the ourtburst floods.
M = Mudslide R = Rockfall T = Thunderstorms causing floods W = Wind action

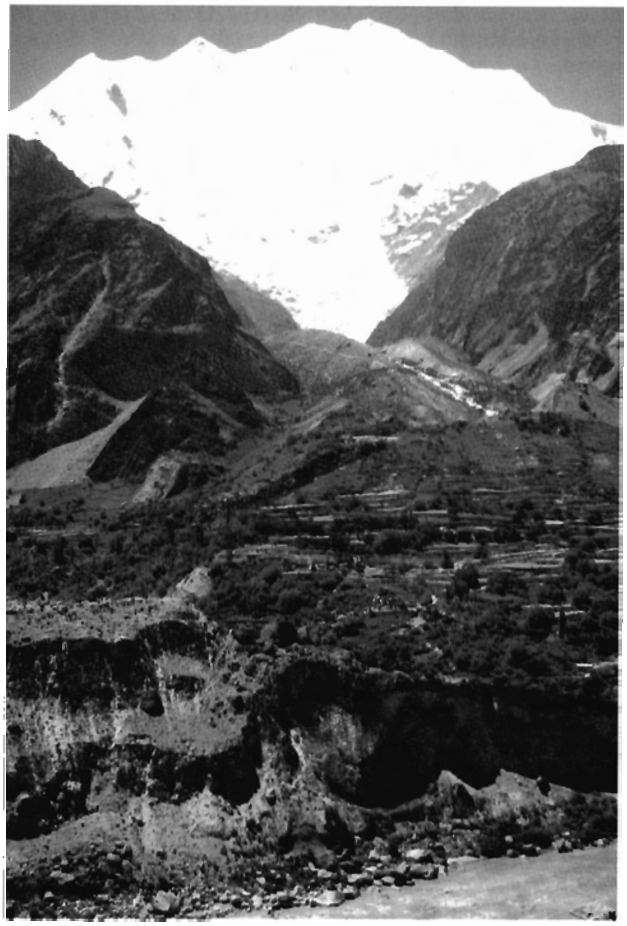
For the period from 1830 to the present day a total of 124 damaging events having occurred in the Hunza Valley could be recorded from archival sources, oral traditions, travelogues, reports, interviews and observations (Fig. 1). The single most important factor of destructive forces has been the movement of glaciers which covers nearly half of all recorded events. Glacial movements cause direct destruction when glacier

Cause of hazard and destruction	Snow & ice avalanches[1]	Glacial movements with primary and secondary effects	Mudslide/ debris flow	Rockfall/ rockslide	Thunderstorm destruction	Wind action
Number of recorded events: 124	28	53	18	15	8	2
Percentage of total [%]	22.6	42.7	14.5	12.1	6.5	1.6

[1] The share of destruction due to snow avalanches has increased since the opening of the Karakoram Highway. Although the route of the KKH was designed to avoid avalanche-prone spots, the change of location of the Shishket-Gulmit bridge after the Baltin Bar glacier surge (April 12, 1974) caused regular closures of the KKH. Since 1974 avalanches affect communication there annually. Source: Fig. 1 contains detailed references and further information for each recorded event.

Fig. 2 Natural hazards in the Hunza Valley 1830–1992

Fig. 3 The gradient profile from Mount Rakaposhi (7,793 m) to the valley bottom of the Hunza River (1,900 m) near Pissan and Minapin (Nager Subdivision) is considered to be one of the steepest slopes on earth. The horizontal distance is approximately 11 km between perpendicular sections of highest and lowest point. Only limited space in reasonably sloped and agro-climatically suitable locations is left for cultivation and settlement on river terraces and scree slopes. The agricultural lands and habitations are vulnerable to glacier advances, mudflows etc. At the same time all cultivation depends on the supply of irrigation water from glacier melt. In October 1925 one man and a significant number of livestock were killed here by a strong wind triggered off by an avalanche in the ice theatre of the Rakaposhi Range above. The pressure wave destroyed almost all fruit trees in the villages of Minapin and Pissan (cf. Fig. 1; Photo: KREUTZMANN, July 27, 1989).



advances lead to the burying of cultivated lands, irrigation systems and roads by ice.[6] More serious effects are generated by the formation of lakes in the river valleys due to glacier advances and the forming of natural dams. Severe hazards occur when these glacier dams break and the water stored in the temporary reservoirs is released in huge floods. Ranked in second position (Fig. 2) are snow and ice avalanches (22.6%), which are as influential as the combined phenomena of mudflows (14.5%) and rockslides (12.1%). Weather-related action from wind and thunderstorms has been of minor importance here. Nevertheless, the heavy rains of September 1992 caused substantial destruction to local infrastructure and agricultural resources. All these events have affected habitations, cultivated areas, roads and bridges to varying degrees (Fig. 3, 4, 6). Earthquake-triggered mass movements have not been registered, although 42 events of earthquakes (Fig. 5) occurred in the Hindukush – Karakoram region between 1876 and 1911, damaging roads and buildings mainly in Chitral and the Gilgit valley. Out of 102 earthquake events with epicentres in northern Pakistan between 1912 and 1971 no damage to habitations could be established for the Hunza and Ishkoman valleys.[7] Systematic instrumental registration of earthquakes commencing in the 20th century has revealed that the majority of epicentres is to be found in the Afghan Hindukush north of Kabul (communication by RICHARD HUGHES, London). The disastrous Hamran (1972: 100 people killed, 1,000 houses destroyed), Pattan (1974: 1,000–5,300 people killed, 18,000 houses destroyed) and Darel (1981: 222 people killed) earthquakes had their epicentres south of Gilgit and

[6] Glacier surges might be triggered by a variety of events including landslides and rockfalls in the ablation zone resulting in a significant deviation in glacier-surface velocities, cf. for a glaciological discussion GARDNER & HEWITT (1990), HEWITT (1969, 1988), KALVODA (1990), SHI YAFENG & WANG WENYING (1984), WENYING, MAOHUAN & JIANMING (1984).

[7] The early events have been extracted from colonial records at the India Office Library & Records, London, with detailed locational information given (cf. Fig. 6).

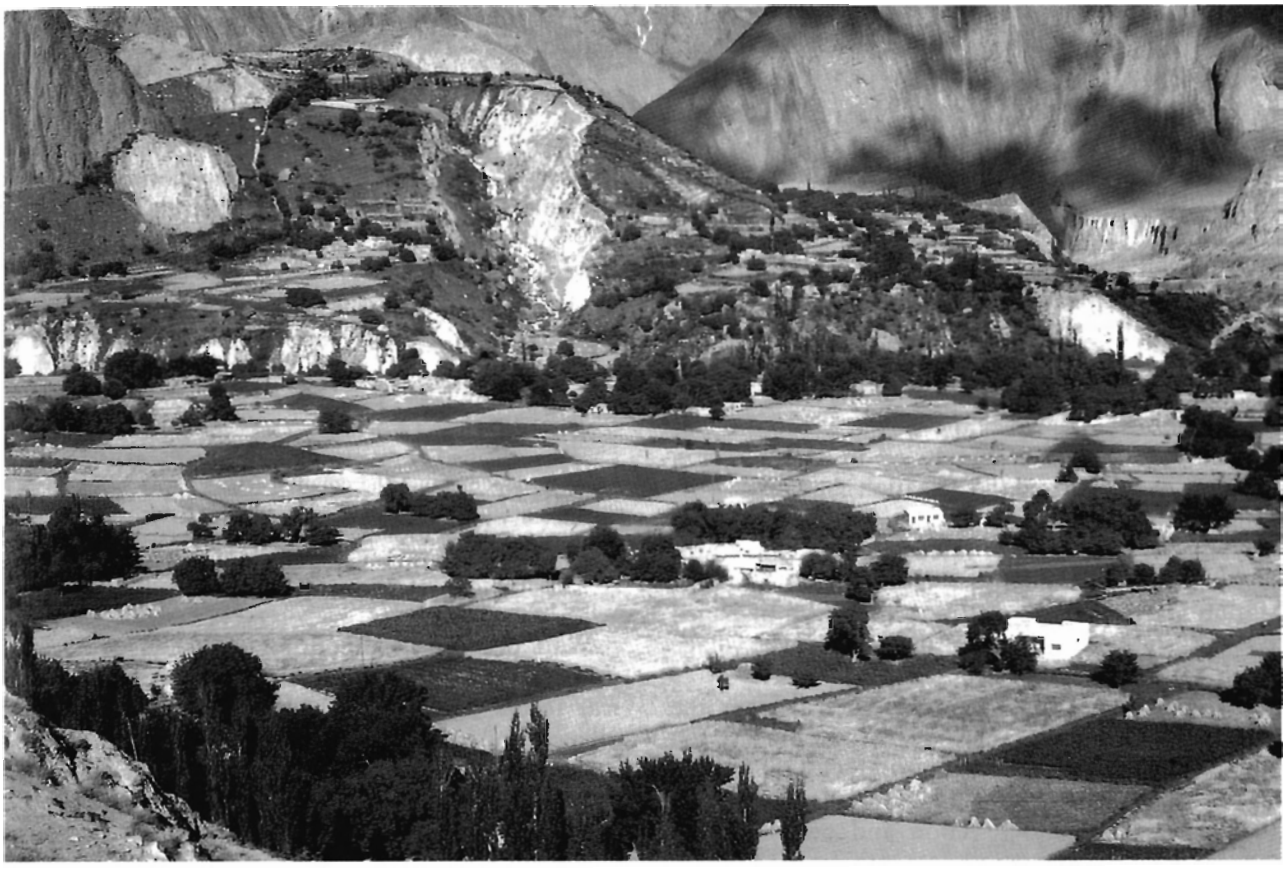


Fig. 4 Settlement pattern in the Shinber area of Nager below Rakaposhi Mountain (7,793 m). The terminal moraine of the Pissan glacier has been cultivated as an extension of the traditional village lands on the flattened river terrace (2,000 – 2,200 m). Present-day settlement structure shows the dominating features of scattered habitations and small hamlets close to the orchards of apricot trees from where agricultural fields can be reached easier than from the former fortified villages. Cultivation of steep slopes has been feasible due to stable soil conditions and meltwater supply from the Pissan glacier. While double-cropping prevails in grain fields of traditional terraces, recently developed lands have been ameliorated by cultivation of lucerne *(Medicago sativa)* and grass in the initial stage of utilization (Photo: KREUTZMANN, July 20, 1985).

only slightly affected the Northern Karakoram valleys.[8] As HEWITT (1983, p. 41) has pointed out, "there is only a weak correlation between earthquake magnitude and scale of disaster". The relationship between earthquake-triggered disasters and settlement patterns has been highlighted for the densely populated mountain rimlands which suffered immensely from recurring hazardous events in comparison with mountain core regions featuring scattered habitations in isolated locations (HEWITT 1984). The threat of destruction in the latter areas has to be linked mainly to glacier action and snow avalanches as well as to a lesser degree to mudslides and rockfalls. The range of all these events is mainly limited to comparatively small locations, while only glacier-related disasters have exerted supra-local effects. Nevertheless, each category features exceptional events demanding an independent assessment.

Within the study period there have been four events only which led to the complete abandonment of settlement sites in the Hunza Valley. The 1830 mudflow and glacier advances in the Chupursan valley have been the most dramatic events, as in consequence a whole tributary valley of the Hunza river had to be given up. All villages were destroyed and covered under a thick layer of fluvial deposits. Only in the 1920s systematic resettlement started again and has continued until today.[9]

Less than two decades later, in 1858, the severe rockfall at Sarat and the damming of the Hunza river caused the flooding of all villages from Sarat to Pasu. In addition to the loss of village lands due to the undercutting of terraces the young village of Sarat was abandoned and only resettled after 1931. Both

[8] HEWITT (1983, p. 31), JACKSON & YIELDING (1984).

[9] HAUGHTON (1913, p. 235) found evidence of a substantial population previously inhabiting the Chupursan Valley above Reshit at the sites of Ispenj and Yeshkuk. During the period of his visit habitations were found only in Kil (5 houses) and Reshit (> 30 houses). Cf. IOL/P & S/10/973, p. 243; General Staff India (1928, p. 112); SCHOMBERG (1935, p. 225; 1936). Nowadays 242 households settle there again in nine villages.

areas had been newly developed filial settlements of settlers from central Hunza (Sarat was settled by people from Altit), and of migrants and refugees from Wakhan (in Upper Hunza and Chupursan), who had superseded Kirghiz nomads and had converted seasonally utilized pasture areas into permanent habitations relying on mixed mountain agriculture.

During the same period a small settlement, Sholemal or Abdullah Khan Dasht, on the southern bank of the Pasu glacier had to be given up due to glacier retreat, which resulted in dried-out channel heads cutting off the meltwater supply to the hamlet which has never been resettled since.[10]

Further down the valley the village of Matum Das (= black desert) was abandoned in 1893, after a mudflow had destroyed the irrigation channel and the settlement of people from Jaglot and Jutal (SINGH 1917, p. 27). Renamed as Pratabsinghpura and nowadays called Rahimabad, in 1905 the recultivation of Matum Das by Hunza settlers began, who managed to establish a new irrigation network and a village which had grown to 179 households by 1991.

Considering the potential risk of settlement in the Hindukush – Karakoram, the record of the last 160 years with a growing population and with the expansion of villages in the Hunza Valley is quite favourable in perspective of site selection and persistence of habitations. The remaining data suggest that nearly all villages have been affected in different degrees by natural hazards, which resulted in loss of cultivated lands, destruction of irrigation and communication networks. Thus the resource potential of existing villages has been diminished by catastrophic events, but they did not destroy central settlements, which adopted different strategies to cover the losses. In the specific case of Gircha in the Ghujal region this factor led to the establishment of a filial settlement nearby named Sarteez. In the case of Pasu new land was cultivated by a number of families in Chupursan villages (Reshit, Shersabz, Ispenj, Zodkhon) and across the river in Kharamabad, especially after the destructive floods caused by the Shimshal glaciers and their natural dam breaks in the 1960s. But it should be. noted that the Hunza Valley has retained its traditional settlement pattern, and villages have expanded dramatically.

The settlement history of the Ishkoman valley is strongly linked to the mass movements caused by the mighty Karambar glacier of the north-eastern branch valley. Three major floods (1844, 1861, 1865) caused massive destruction of settlements in the lower parts of the valley, so that in the map prepared by GEORGE HAYWARD (1871) only two settlements are mentioned: Ishkoman proper in a side valley out of reach for the Karambar floods, and Chatorkhand. Present-day Chatorkhand is the most important settlement on the left bank of the Ishkoman river. In HAYWARD'S map Chatorkhand is located on the right bank, where the village of Dain is situated. As Dain enjoys a site composed of terraces at different levels, it is probable that only higher-elevated hamlets survived the floods. But not only natural hazards caused the low population density of Ishkoman during this period, as JOHN BIDDULPH (1880, p. 32-33) observed:

"Formerly this road [via the Ishkoman Pass] was a favourite one, but owing to recent physical change it has now fallen into disuse. The Karoomber Valley, which contains the ruins of several large villages, now supports only 300 souls. The former inhabitants are said to have been exposed to constant forays from the Wakhis and Sirikolis, but the wars of the Yassin rulers since the beginning of the century have been the most powerful agent in depopulating the country. The security given to the inhabitants in one way has been accompanied by a fresh source of danger to them in another. More than once the glacier has temporarily dammed up the stream until sufficient water has accumulated to burst the barrier and carry destruction to the valley below."

Wars between neighbouring hereditary rulers and principalities, changing coalitions of dominating political forces and raids which led to plundering of villages and deportation of individuals into slavery affected the survival conditions of people in valley societies like Ishkoman.'[11] The notorious problem of dam-break floods continued even after the colonial "pacifying" campaigns in the Hindukush – Karakoram: in 1893, 1895, and 1905 major floods from the Karambar caused losses of land in villages along their way downvalley and destroyed bridges even in Gilgit Town.[12] In 1905 two glacier dams formed at the beginning of April (below Sukhtarabad by the Chillinji glacier, above Bhort by the Karambar glacier). Formation of the two lakes continued until June 17 when the dam broke, causing a rise of the water level at Gilgit Town of more than 6 m within a few minutes.

[10] The excellent location high above the KKH has been investigated by different development agencies which have considered proposals to recultivate this area. Due to a loss of ice mass volume in the Pasu glacier it seems to be extremely difficult to tap glacier meltwater and connect it with the old channel system in the southern ablation valley along the Pasu glacier.

[11] These were not unique phenomena applying to Ishkoman only: a similar population loss occurred in Bagrot during the first half of the 19th century. A raiding party from Yasin had arrested the majority of the people and deported them into slavery. When half a century later ALGERNON DURAND visited the Bagrot valley in 1889, he still observed huge portions of the village lands being uncultivated and ruined habitations (DURAND 1899, p. 212). Confrontation between the Dogra invaders from Kashmir and the local people of Yasin in 1863 decimated the population by 1,200–1,400 persons who were massacred (HAYWARD 1871, p. 4-6).

[12] For Karambar flood events cf. DREW (1875, p. 418-420); HAYWARD (1871, p. 5); IOL/P & S/7/80; IOL/P & S/10/973, p. 22; IOL/P & S/12/3288, p. 232; TODD (1930, p. 174); SINGH (1917, p. 6).

Year	Date	Locality of recording	Damage/Remarks	Source/Reference
1876	July	Taxkorgan	damage to the fort	BIDDULPH (1876, p. 110)
1885	30. 05.	Srinagar	damage at Srinagar	NEVE (1913, pp. 37-43)
	04. 06.	Gilgit	damage at Srinagar (86 persons killed)	IOL/P & S/7/44/1113
	12. 06.	Gilgit	3,000 persons killed in Kashmir (2,000 in Muzaffarabad)	IOL/P & S/7/44/1113
	17. 06.	Gilgit	livestock killed	IOL/P & S/7/44/1113
	19. 06.	Gilgit	damage at Baramullah	IOL/P & S/7/44/1113
	24. 06.	Gilgit		IOL/P & S/7/44/1113
1893	November	Karambar	damage in river gorge, destruction of track	COCKERILL (1939, p. 28)
1895	05. 07.	Hunza	several shocks of an earthquake at Hunza	PRO/FO65/1506, p. 249
1896	15. 01.	Chitral	Drosh Fort tower collapsed	IOL/P & S/7/84
		Chitral	damage to villages and roads	IOL/P & S/7/84
		Gupis	damage to Gupis Fort	IOL/P & S/7/84
	03. 03.	Murtazabad	blockage of track	IOL/P & S/7/85
	04. 03.	Sarikol	severe shock: death of 2 men and several sheep in Taghdumbash proper and 4 Sarikolis with 170 yaks in Raskam	IOL/P & S/7/86
	09. 05.	Gupis	slight shock	IOL/P & S/7/87
	24. 09.	Gupis	shock lasting for several minutes	IOL/P & S/7/89
1899	02. 07.	Gilgit	damage to Agency house; to be pulled down	IOL/P & S/7/115/803
1900	03. 04.	Gilgit	damage to old hospital, barracks at Jutial	IOL/P & S/7/122/535
	31. 10.	Hunza	shock	IOL/P & S/7/128/1313
		Chilas	considerable damage to road	IOL/P & S/7/128/1313
1902	22. 08.	Kashgar	damage at Consulate building	IOL/P & S/7/149/1417
	31. 08.	Kashgar		IOL/P & S/7/149/1417
	02. 09.	Kashgar		IOL/P & S/7/149/1417
	20. 09.	Gupis		IOL/P & S/7/149/1417
	05. 10.	Hunza	no damage	IOL/P & S/7/150/1574A
		Chitral	irrigation channel damaged	IOL/P & S/7/150/1653A
	06. 10.	Chitral	buildings destroyed	IOL/P & S/7/149/1417
1903	13. 03.	Kashgar	several shocks and a severe one	IOL/P & S/7/154/729
	27. 03.	Chitral	some damage to hospital building	IOL/P & S/7/153/577
	07. 07.	Kashgar	fair shock of earthquake 5.29 p. m.	IOL/P & S/7/157/1234
1905	13. 04.	Chitral	slight shocks on April, 13 and 14	IOL/P & S/7/177/891
	30. 04.	Chitral	slight shocks at 3.39 a. m.	IOL/P & S/7/177/965
	10. 10.	Gilgit	slight shocks at 1.55 p. m.	IOL/P & S/7/177/965
1907	13. 04.	Chitral, Gilgit	severe shock of earthquake at 11 p. m. (half a minute)	IOL/P & S/7/1201/888
	26. 12.	Gilgit	a sharp shock of earthquake at 4 p. m.	IOL/P & S/7/211/382
1908	13. 03.	Chitral, Gilgit	severe shock of earthquake at 1 a. m.	IOL/P & S/7/215/850, 851
	20. 08.	Chitral	severe shock of earthquake	IOL/P & S/7/222/1967
	18. 12.	Chitral	sharp shock	IOL/P & S/7/225/250
	21. 12.	Chitral	slight shock at 6 p. m.	IOL/P & S/7/225/250
1909	08. 07	Gilgit	severe earthquake at 3 a. m.	IOL/P & S/7/230/1275
	08. 09.	Gilgit	shock of earthquake at 9 p. m.	IOL/P & S/7/2233/1556
1911	18. 02.	Gupis	severe earthquake for 2 minutes 11.15 p. m.	IOL/P & S/7/248/691[1]
	20. 02.	Hunza	severe earthquake for 2 minutes 12 p. m.	IOL/P & S/7/248/691
	24. 02.	Gupis	severe earthquake for 2 minutes	IOL/P & S/7/248/691
	03. 07.	Gilgit	slight shock at 7.15 p. m.	IOL/P & S/7/251/1459
	17. 09.	Gupis	slight shock at 9.30 p. m.	IOL/P & S/7/253/1893

[1] Cf. STEIN (1932, p. 16) for the earthquake's effects on the Pamir.

Fig. 5 Earthquake incidence in the Northern Areas and Chitral 1876–1911

Within 12 years the newly built suspension bridge at Gilgit was destroyed for a second time. No casualties were registered. Cultivated lands in Ishkoman, Punial and Gilgit were affected (fishes were even detected on normally flood-protected terraced fields in Chatorkhand), and the telegraph lines, Gulapur Fort and one mosque damaged. For an extended period the route to Wakhan remained unpassable.[13] Contrary to the case of Hunza the settlement and cultivation process in Ishkoman was seriously retarded by these man-

[13] IOL/P & S/7/177/849: Gilgit Diary 8. 4. 1905; IOL/P & S/7/179/1229: Gilgit Diary 24. 6. 1905; IOL/P & S/7/180/1338: Gilgit Diary 15. 7. 1905.

Fig. 6 A mudflow destroyed a substantial part of the village (2,660–2,700 m) of Darkot (Yasin Subdivision) in 1978. Only a marginal portion of the lands could be recultivated since, while parts of the permanent settlement have been shifted towards safer locations. Some farmers have established new habitations on the right bank of the Darkot River (2,700 m) while others have moved permanently to their summer settlements at higher elevations (2,900–3,000 m). Photo: KREUTZMANN, September 5, 1990

made and natural hazards. At the turn of the century Col. J. MANNERS-SMITH, Political Agent (P. A.) in Gilgit, recorded that "Ashkuman Valley . . . is one of the most unhealthy portions of the Gilgit district".[14] Nevertheless Ishkoman has been the destination of different immigrant groups since. The population dynamics within a hazardous environment have to be investigated for an evaluation of the expansion process.

4. Population growth in the Hindukush – Karakoram

Comparing the population growth of the high mountain belt of Pakistan with the rest of the country, the calculations prove that both subregions have registered overall population increases during the 20th century and that the average annual growth rate is higher in the lowlands than in the mountain regions. The rate for the Hindukush – Karakoram ranged at 0.67% for the period 1911–1951, and at 2.30% for 1951–1981 as compared to 1.40% and 3.08% for Pakistan respectively. The population of the territory comprising present-day Pakistan increased between 1901 and 1991 from 17 million to 114 million, thus making it the tenth most populous country in the world, and with the highest growth rate of this group as well: 2.1% per annum on average.

Analysing the data on a regional level in a historic perspective (Fig. 7) and calculating population densities areawise as well as growth rates (Fig. 8), a differentiated demographic pattern emerges. The first half of this century registered moderate growth rates of population in the mountain belt (0.67% per year), whereas since 1951 significantly higher annual rates (2.30%) have been recorded. The developments in the Hunza subdivision in the early phase reflect a higher growth rate (1.11%) than average, and a lower one since 1951 (1.93%).

Regional differentiation presents low rates in the western (Chitral) and eastern (Baltistan) wings, while the centre (Gilgit & Ghizer) grew much faster. The

[14] IOL/P & S/7/135/852: Gilgit Diary 8. 6. 1901. In the previous year the entry remarked: "The unhealthiness of the Ashkuman valley was attested to by the numerous cases of enlarged spleen . . ." (IOL/P & S/7/129: Gilgit Diary 8. 12. 1900).

Region	1911	1921	1931	1941	1951	1961	1972	1981	1991
Gupis (= Kuh & Ghizer)	5,701	6,321	6,919	8,512	8,249	11,303	14,282	18,055	21,184
Yasin	6,310	7,065	8,084	9,989	9,453	12,139	16,006	20,347	25,442
Ishkoman	2,020	2,753	2,985	4,282	4,975	6,110	9,378	12,534	17,283
Punial	4,423	5,492	6,108	8,164	8,990	11,790	15,865	21,441	31,420
Hunza	10,126	12,277	13,535	15,341	15,691	21,291	26,544	27,797	34,607
Nager	13,347	14,188	13,664	14,874	18,353	17,623	25,63[1]	28,000[1]	34,042
Chilas	12,508	13,135	13,521	15,364	16,060	19,312	35,877	40,964	
Gilgit Subdivision	15,675	17,654	18,565	22,495	24,572	32,682	50,679	79,996	108,809
Gilgit Town	3,562	4,393	4,474	4,671	4,761	3,405	17,629	30,410	40,000
Gilgit Agency/ District[2]	57,602	66,788	69,861	76,526	90,283	112,938	158,385	228,170	272,787
Baltistan District	106,795	102,745	107,477	120,000	125,162	131,952	168,550	223,668	280,972

[1] Population figures for Nager (1981) have been adjusted from 45,880 to 28,000. Multiple counts of seasonal and permanent habitations which could be identified as a systematic error distorted the previous sample size.

[2] Gilgit Agency/District here includes the whole area of present-day Gilgit and Ghizer Districts.

Source: own calculations based on AFRIDI (1988, p. 281), Census of India (1912, XX), Census of India (1923), Census of India (1933), Census of India (1943), General Staff India (1928, p. 38), Government of Azad Kashmir (1952, Tab. 7), Government of Pakistan (1975), Government of Pakistan (1984 a, b), HASHMATULLAH KHAN (1987, p. 149), PAL (1928, 1934), STALEY (1966) and own data gathering.

Fig. 7 Distribution of population in administrative units of the Hindukush – Karakoram 1911 – 1991

population development in Ishkoman is an exceptional case: from 1901 to 1991 the population increased from 995 inhabitants to more than 17,200, a relation which sets the average annual growth rate at 3.22% and which is the highest of all valleys surveyed (Fig. 9).[15] What processes have contributed to this development in Ishkoman?

5. Settlement and migration in Ishkoman

The dilapidated condition of the village, with only 300 people living in Ishkoman observed by JOHN BIDDULPH in 1878, marks the beginning of the following growth period. At this stage the most important settlement in the valley was the old-established fortified village of Ishkoman proper. The present Shina-speaking inhabitants claim origin from Chilas, Darel, Bagrot and Yasin and command the oldest irrigation network of the valley. According to oral tradition the settlement spans a period of three centuries of continuous habitation. SCHOMBERG (1935, p. 268) charac-

[15] Data for 1901 calculated from figures presented in IOL/P & S/7/246/815: Gilgit Diary March 1911: Census of 1911: population estimates for 1991 according to own survey. The average population growth for the period 1911 – 1951 ranged at 2.27% per year for Ishkoman, well above the average of 1.95% for Punial/Ishkoman (Fig. 8).

Fig. 8 Population density in the Hindukush – Karakoram 1911, 1951 and 1981

Region	Area [km²]	Population density [Inhabitants per km²]			Average annual growth rate [%]	
		1911	1951	1981	1911–1951	1951–1981
Hindukush – Karakoram[1]	72,628	3.37	4.41	8.81	0.67	2.30
Chitral Subdivision	6,458		7.67	18.83		3.04
Mastuj Subdivision	8,392		6.56	10.36		1.53
Chitral District	14,850	5.40	7.05	14.04	0.67	2.32
Gupis/Yasin Subdivision	7,487	1.60	2.36	5.13	0.97	2.62
Punial/Ishkoman Subdivision	4,271	1.51	3.27	7.95	1.95	3.01
Ghizer District	11,758	1.57	2.69	6.15	1.35	2.79
Hunza Subdivision	11,695	0.86	1.34	2.38	1.11	1.93
Nager Subdivision	4,142	3.22	4.43	6.76	0.80	1.42
Gilgit Subdivision	3,989	3.93	6.16	20.05	1.12	4.01
Gilgit District[2]	19,826	1.97	2.96	6.85	1.02	2.83
Baltistan District	26,194	4.07	4.78	8.54	0.40	1.95
Gilgit Town	50	71.24	95.22	608.2	0.90	4.79

[1] Hindukush – Karakoram comprises Chitral, Ghizer, Gilgit & Baltistan Districts.

[2] Gilgit District here includes the subdivisions of Gilgit, Hunza and Nager.

Source: own calculations based on figures given in Fig. 7, AFRIDI (1988, p. 11), Government of Pakistan (1975).

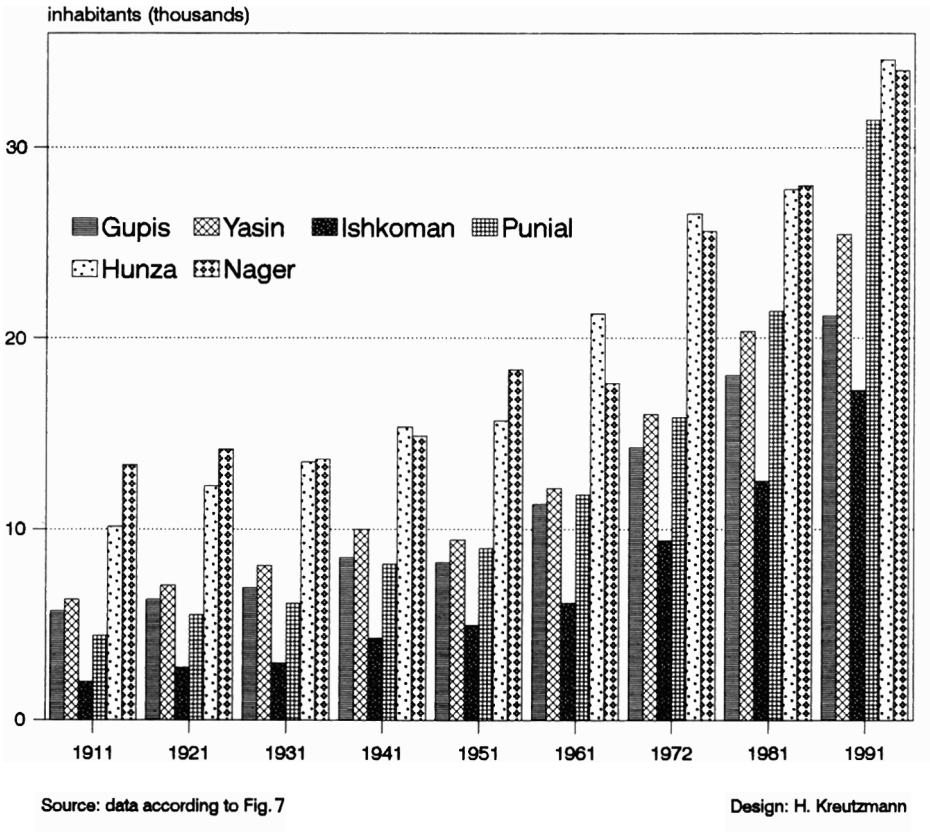


Fig. 9 Population growth in the Hindukush – Karakoram 1911–1991

terized Ishkoman as follows: "Formerly it was used as a kind of penal settlement by the Yasin princes who sent all their undesirables, whom they had not murdered, to sojourn in the small village of Ishkoman, in those days the only inhabited place in the district." JETTMAR (1989, p. 74) emphasized the origin of the people from Chilas and proposed the hypothesis "that a foreign invader had exterminated the previous population".[16] The earliest channels of the main oases are dated back by local historians of the contiguous Khowar-speaking villages of Chatorkhand and Pakora to 130–150 years before present (SAUNDERS 1983, pp. 136, 142–143). These settlement nuclei have experienced different waves of immigrants, predominantly from Saiyid families from Ghizer, Turkho and Laspur (Chitral) who cultivated extensive stretches of new land in the valley with the help of wage labourers and contract workers from Tangir and Darel.[17] The Chitral rulers and later on the colonial authorities allotted land to members of the Khushwaqte, a branch of the ruling class in Chitral, who established some estates in Ishkoman as well.[18]

Another important wave of immigrants originated from Wakhan. By decree of the Mehtar of Chitral followers of the deposed Mir ALI MARDAN SHAH were permitted to resettle in the hazard-prone Karambar Valley since 1883. In 1896 Mir ALI MARDAN SHAH was appointed as Governor of Ishkoman and attracted more Wakhi settlers towards the upper part of the valley where he had taken his refuge at Imit. By 1906 the population of Ishkoman was composed of three dominant ethno-linguistic groups (Fig. 10): Kho, Wakhi and Shina speakers. Until today these are the most prominent groups. According to their own oral traditions, Gujur nomads have been migrating to Ishkoman since 1910. In the beginning they seasonally utilized pasture areas in the valley; later on they were hired as shepherds by landlords to take care of their livestock. This resulted in permanent Gujur settlements and cultivation.[19] Other immigrants followed such as the Burusho from Hunza, Uigur refugees from Xinjiang, and Pathan traders

[16] The information about the duration of settlement has been communicated by Prof. Dr. KARL JETTMAR, Heidelberg, and is gratefully acknowledged.

[17] In 1909 potential settlers and seasonal workers had come in big numbers to Ishkoman: 106 families and 10 labourers. Other groups of similar size migrated to Punial (106/20) and the Gilgit Wazarat (101/47) while in Yasin (16133) and Chilas (291176) groups of different proportions were recorded (IOL/P & S/10/278: Letter of Political Agent, Gilgit to Resident Kashmir, dated Gilgit 2. 10. 1909).

[18] IOL/P & S/7/188/1024: Gilgit Diary 8. 5. 1906. The Khushwaqte have been the former rulers of Mastuj, Yasin and Ghizer (cf. BIDDULPH 1880, p. 151-154; SCHOMBERG 1935, p. 37-47, 255–270).

[19] The population census of 1931 omits any record of Gujur permanent settlements in Ishkoman (PAL 1934). For an assessment of recent developments in the Asumbar valley cf. LANGENDIJK (1991).

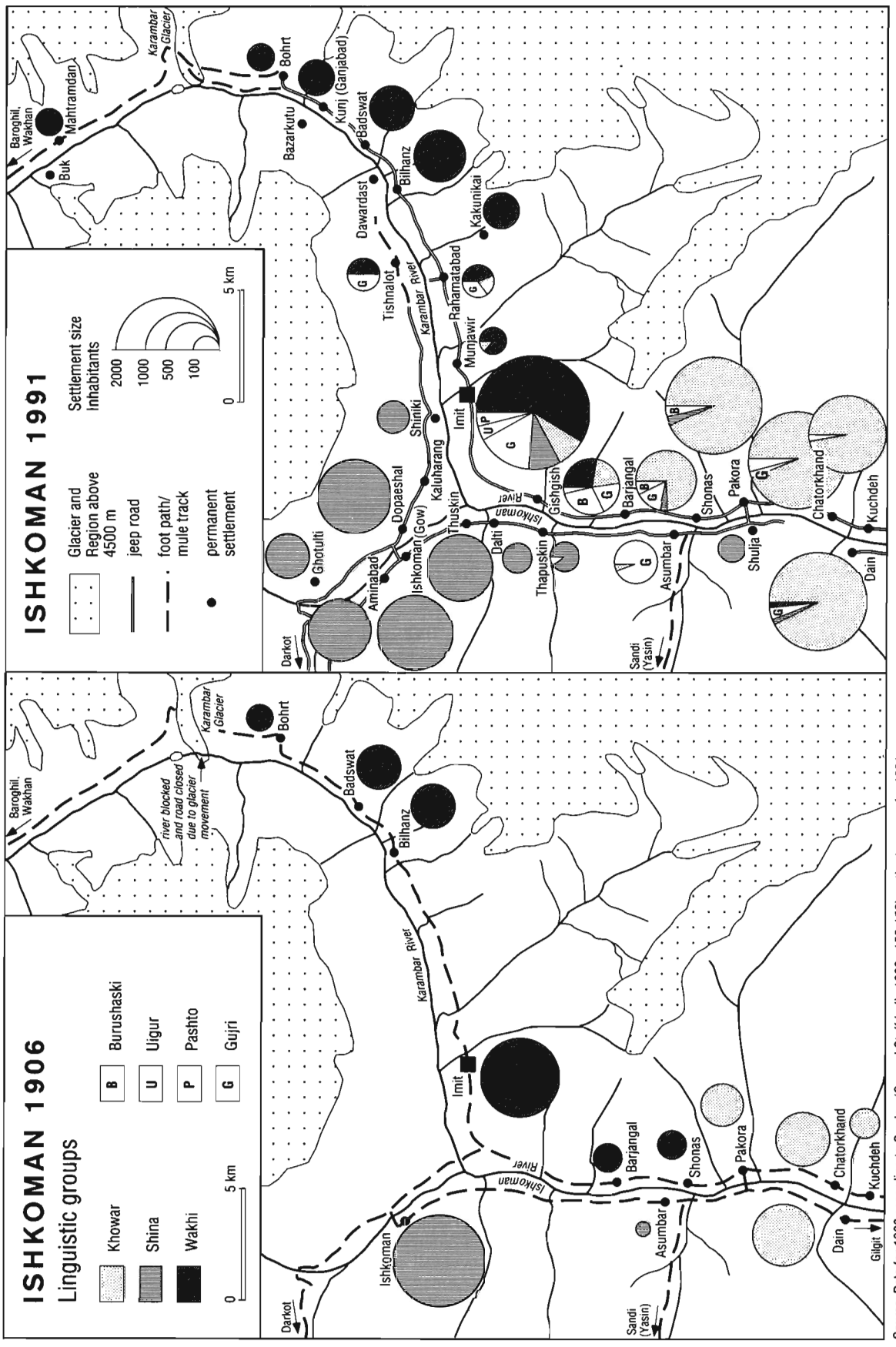


Fig. 10 Comparison of population composition in Ishkoman 1906 and 1991

from Bajaur. The last group took residence in Imit since 1963 when the first Pathan shop opened. The major village of Ishkoman – Imit with app. 250 households in 1991 – appears as a multilingual village with a mosaic pattern of six different language groups.

Ishkoman as a whole comprises a type of valley which on the one hand gave shelter to refugees from neighbouring regions, and on the other hand has attracted numerous intra-montane migrants in search of cultivable land at low prices. Nomads such as the Gujur herders took residence as well, as did formerly itinerant Pathan traders who have become influential entrepreneurs in the bazaars of Imit and Chatorkhand. The peripheral status of Ishkoman within regional power struggles and the lack of a strong hereditary rulership classified this valley as a resourceful frontier for needy and enterprising settlers. Thus the extraordinary population growth within the 20th century, which even surpasses the rates for down-country Pakistan, finds its explanation mainly in outstanding immigration. New settlements have been established in locations on fluvio-glacial terraces and fans which are under constant threat by undercutting. The only recorded hazardous event in addition to those presented above goes back to 1931 when a major loss of cultivated land was reported (IOL/P & S/12/3288, p. 232). In order to reduce these processes and to control undercutting of terraces, experiments with protective bunds in the flood plain have been executed by different development agencies to safeguard existing village lands. In recent years major losses of land occurred in Shiniki and Gishgish, where a mudslide and lateral erosion destroyed valuable orchards and grain fields. Nevertheless the expansion of habitations and irrigation oases has continued there.

6. Settlement processes in the Hunza Valley

The Hunza Valley comprising the two formerly independent principalities of Hunza and Nager has experienced a pattern of population dynamics different from that of Ishkoman (Fig. 7, 9). The growth rates within the 20th century reflect a higher than average rate for the first four decades and a slowed-down increase for the period 1951–1981 (Fig. 8). Basically the number of inhabitants doubled between 1931 and 1981. The impact of this population growth has found its spatial expression in the expansion of settlements within the valley and the establishment of extra-territorial migrant colonies outside the former principalities.

The settlement process in Hunza has been reconstructed for the last 200 years.[20] For reasons of structural change and out of convenience this epochal growth cycle might be divided into four different phases (Fig. 11).

6.1. Period of nuclear villages (pre–1800)

Of all the villages in Central Hunza existing until today the oldest seem to be the three original *khan* (fortified villages) of Ganesh, Altit and Baltit, as well as the artisans' settlement of Dumyal or Berishal. The Dom have been providing services as musicians and blacksmiths to the Burusho farming communities of the three „original" villages in the main irrigation oasis of Central Hunza.[21]

Until today the remnants of the old nuclei suggest a close relationship between site selection and defence purposes, while safeguarding access to water supply and agricultural lands at the same time. Hindi constituted the only *khan* in the lower region of Shinaki where Shina-speakers have been living. The upper part of the Hunza Valley was dominated by Kirghiz nomads who seasonally utilized the high pastures there. The system of fortified villages and their structural elements[22] were quite common all over the Hindukush – Karakoram region, giving protection in times of threat by outside intruders.

6.2. Pre-colonial phase of oases expansion and internal colonisation (1800–1891)

The first quarter of the 19th century experienced the establishment of a number of filial settlements in Central Hunza linked to population growth and the innovative expansion of the irrigation network under THAM SILUM KHAN III (Fig. 11: phase II). At the same time this ruler extended the sphere of Hunza dominance northwards, expelled Kirghiz nomads from Ghujal and allowed immigrating Wakhi settlers to found villages within the Burusho *cordon sanitaire*. The northern passes were controlled from the *khan* of Misgar and Khudabad, while in the south Maiun formed an important defence line towards Gilgit. All

[20] The sources of information include oral traditions about the extension of irrigation networks and the establishment of filial settlements, colonial reports and records as well as travelogues (cf. in detail KREUTZMANN 1989, p. 48-59). The systematic recording of genealogical affiliations of founders of new settlements and village histories have supported the reconstruction of the expansion process. For a brief account of the settlement expansion process in the principality of Nager cf. FREMBGEN (1984).

[21] In 1981 Dumyal has been renamed into Mominabad (cf. SCHMID 1993), in 1983 Baltit became Karirnabad, and Hindi was relabeled into Nasirabad.

[22] The terms for these villages differ: *khan* in Burushaski, *kalha* in Wakhi, *qila* in Pashto, kor in Urdu. Essentially they describe the same type: a fortified village composed of contiguous houses at different levels; sometimes a tower *(shikaari, shingri)* and a mudwall support the defensive character of the village which commands an elevated spot in the middle of or in vicinity to the village lands; cf. BIDDULPH (1880, p. 29-30), JETTMAR (1961, p. 86), KNIGHT (1895, p. 463, 475), LORIMER (1935–1938, I, p. XLI-XLII; 1979, p. 96-98).

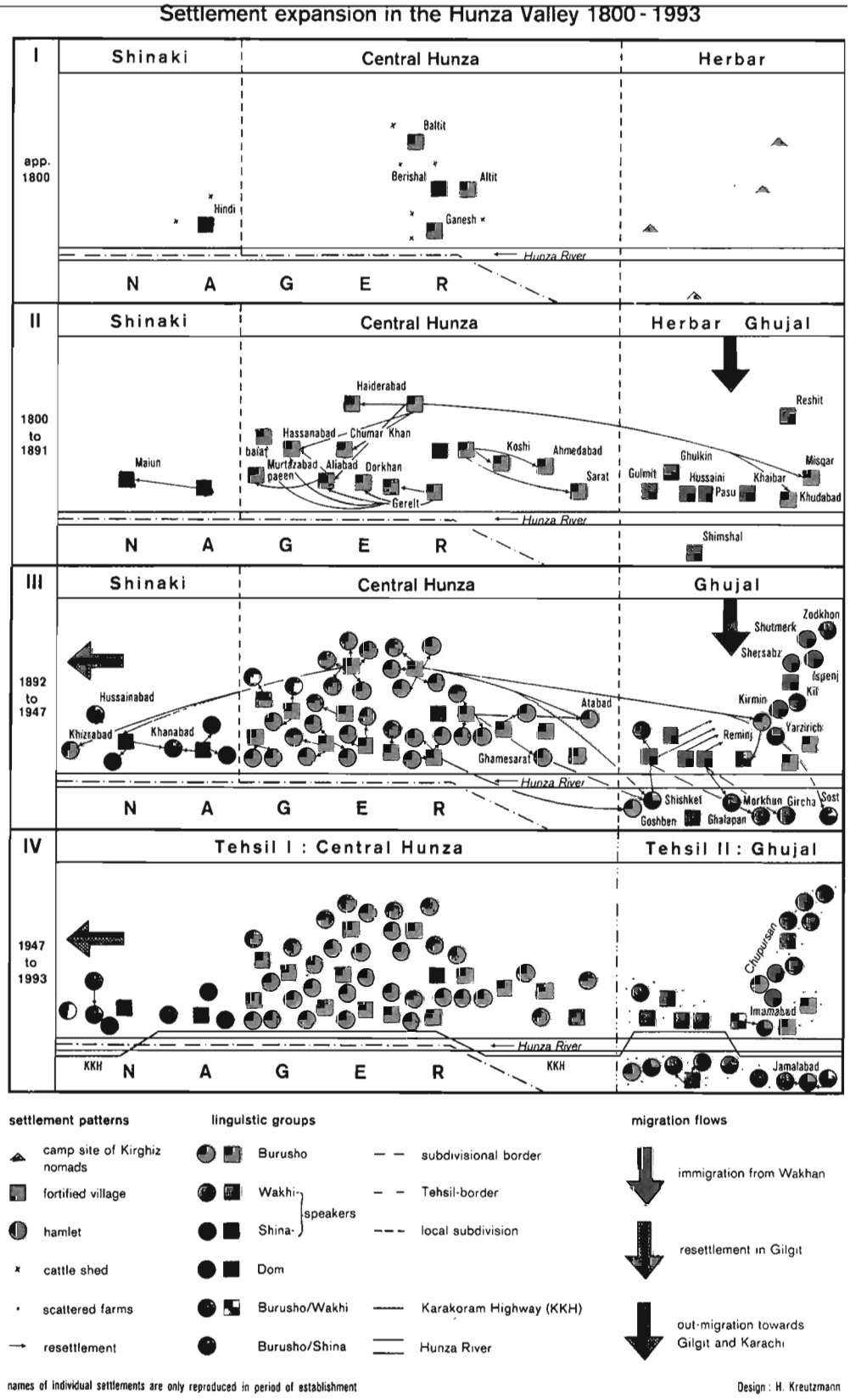


Fig. 11
Settlement expansion in the Hunza Valley 1800 – 1993

new villages of this period were designed as compact settlements with fortifications in the traditional *khan* style. Along the routes a system of obstacles and barriers *(darband)* had been introduced to control the movements of inhabitants and travellers between the settlement areas of different sections *(maqsoo)* of Hunza. The number of villages increased from five to 25 during this period of internal colonisation.

6.3. *Settlement concentration processes under colonial supremacy (1892–1947)*

The short but effective "Hunza Campaign"[23] of 1891 had a lasting influence on the settlement pattern. The structural element of *khan* disappeared, and a process of populating unfortified hamlets *(giram)* within the village lands started thus reducing the distance between habitations and fields. In connection with the construction of new irrigation channels the colonisation process of barren lands was extended into the peripheral regions of Shinaki and Ghujal (Fig. 11: phase III). A number of new villages was founded especially during the 46-year-long reign of Mir M. NAZIM KHAN (1892–1938). He and his wazirs were the prominent figures during the second phase of internal colonisation (cf. NAZIM KHAN 1936). The expansion led to a compact network of contiguous major oases in central Hunza and to the melioration of cultivable tracts according to available technology. Nevertheless already in 1909 the P. A. ARMINE DEW observed that the carrying capacity of the agricultural lands in Hunza might have been exhausted and that emigration would be the only solution to the problem of a growing population.[24] Since the beginning of the century this topic had continued to be a constant matter of dispute between the colonial administration in Gilgit and the Mir of Hunza who demanded the supply of barren lands for the "surplus population of Hunza". In a colonial file of that title from the year 1900 the considerations and demands are quoted: "As regards land in the Gilgit Agency he [the Mir of Hunza] would gladly accept any wasteland provided it seemed possible for his people to bring water onto it and provided the grant of the land did not involve the entire Separation of his people from connection with him and his authority over them" (IOR/2/1075/217, p. 49). Earlier attempts by colonial departments such as the "Cultivation Company of the Gilgit Agency" had failed to construct lasting irrigation channels at Matum Das and Chamogar. In addition barren lands at Punal Das (= Oshikandas) and Gwachi (between Nomal and Chalt) had been identified for melioration projects.[25] Different resettlement projects for Hunza farmers resulted: in 1908 the first lands were allocated in Matum Das (Rahimabad); the second scheme followed in 1912; the channel project of Oshikandas provided Hunza farmers with 312 acres of land and the Bagroti landowners with 1,188 acres in 1938–39; from 1940 onwards different irrigation schemes in Danyor attracted more migrants. Besides the founding of those irrigation colonies individual farmers acquired agricultural lands in the vicinity of Gilgit Town.[26] This emigration process has continued until today, although nowadays the pull-effects of Gilgit as a workplace for non-agrarian occupations supersede the attraction of melioration projects.

6.4. *Village growth and response to improved communication systems (from 1947 to the present)*

Since the independence of Pakistan and the improvement of communication lines towards the Indus basin the dominant factors to alleviate population growth in the Hunza Valley have been the expansion of existing villages, emigration to Gilgit and extra-montane migration to down country. Basically the process of founding new independent villages has been stopped; exceptions have been during the rule of the last Mir of Hunza, JAMAL KHAN (1945–1974), Sarteez (1950), Imamabad and Jamalabad (1960) in Ghujal. All villages have experienced an increase in households and a concentration process of settlements (Fig. 11: phase IV). The extension of jeeproads to Hunza since 1957 and the opening of the KKH in 1978 supported a reorientation of site selection for commercial and administrative buildings in the villages towards access roads where small bazaars have been developed. Valuable agricultural lands were expropriated for the construction of physical infrastructure. New building materials brought in from distant bazaars allowed for cheaper construction of housing.[27] As a general observation settlement concentration is governed by

[23] Contemporary accounts of the Hunza Campaign have been given by KNIGHT (1895), NAZIM KHAN (1936). For an evaluation of the historical developments and its effects on Hunza's exchange relations cf. KREUTZMANN (1993).

[24] Gilgit Diary March 1909 (IOL/P & S/7/228/702).

[25] IOR/2/1075/217, p. 50-54.

[26] IOL/P & S/12/3288: Administration report for the Gilgit Agency for the years 1938, 1939; KREUTZMANN (1989, p. 183). The irrigation scheme of Harathingdas (nowadays: Jalalabad) by farmers from Teisot and Bilchar was completed in June 1939 (IOL/P & S/12/3285: Gilgit Agency Diary June 1939). The villages with migrants from Hunza and Nager include: Nomal, Naltar, Gujur Das (Sultanabad), Jutal, Gwachi, Diding Das (Muharnmadabad). At the junction of the Ishkoman and Gilgit river Hunza settlers have cultivated the colony of Golodas.

[27] The costs for a selection of building rnaterials such as cement, corrugated iron sheets and wooden beams from the Indus Valley have undercut purchasing and construction costs with locally available and treated products such as dressed stones and timber from fruit trees.

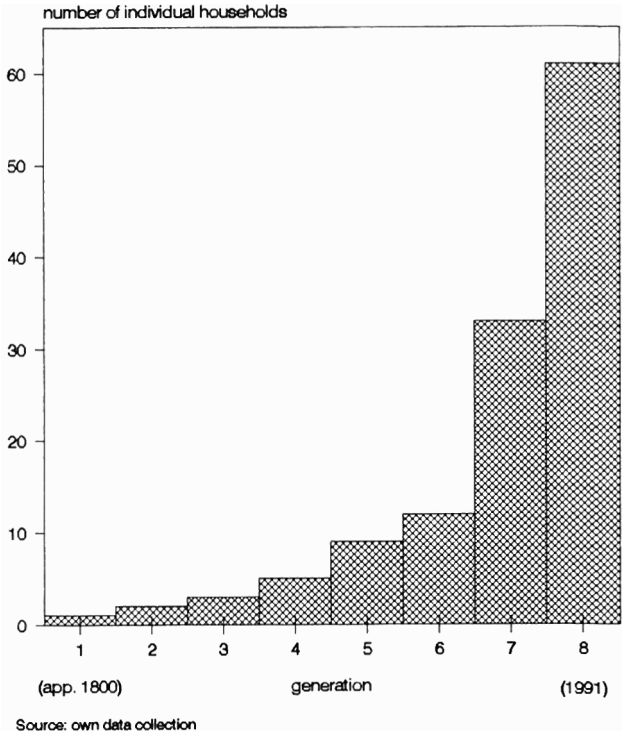


Fig. 12 Settlement growth and generational split of Abgerchi households in Ghujal

the network of communication lines for motorized transport.

Improved accessibility has not only supported the transport of goods, but also enhanced the mobility of people. Rural-urban migration towards Gilgit Town has led to the resettlement of a substantial number of households there. In contrast to extra-montane migrants who leave their rural villages in search for wage-labour in the industrialized South only temporarily, the settlers in Gilgit have separated themselves from their inherited land property and have become permanent citizens of Gilgit Town. Nevertheless the economic links within the community are strong and have led to an extension of commercial undertakings from Gilgit into the Hunza Valley in recent years. The Karakoram Highway has supported commuting between village and town. Thus an actual evaluation of the settlement process in the Hunza Valley has to take into consideration the increasing impact of economic exchange relations onto individual households there.

The overall increase of habitations in the Hunza Valley may be exemplified by the expansion of the Abgerchi kinship group of Ghujal. In the beginning of the 19th century the epical ancestor BABA SUFI migrated from Gharan to Abgerch (nowadays a seasonal settlement in Ghujal above Morkhun) in the Hunza Valley where ruins of early fortifications are to be found.[28] In the course of eight generations the number of households claiming descent from BABA SUFI has multiplied (Fig. 12). Presently 61 households residing in five different villages of Ghujal belong to the Abgerchi kinship group. Comparing the number of households in different periods of this century with the available information[29] on settlement sizes in Ghujal supports the thesis of overall population growth and the split of households in connection with the expansion of settlements and the construction of irrigation systems in newly founded villages. This process of settlement concentration and intensification of agricultural practices has been supported by immigration from neighbouring valleys, which has ceased in recent years.

7. Conclusions

The impact of natural hazards and catastrophic events has set the stage for potential settlements in a severely affected environment. Only a minor proportion of land is habitable for sustainable settlements in irrigation oases. Nevertheless a steady growth process of the resident population has continued until today. Two case studies have been investigated which represent two different patterns of survival and settlement strategies in the research area. On the one hand societies have developed in valleys which have been occupied by residential groups organized in a hierarchic system with hereditary rulership such as in the principalities of Chitral, Yasin, Punial, Gilgit, Hunza, Nager, Skardu, Shigar, Khaplu etc. Here we find a core of traditional villages from where filial settlements within the valley or in the neighbourhood branched off. On the other hand there exist valleys such as the Yarkhun, Laspur, Ghizer and Ishkoman with traditional links to neighbouring principalities, which supported an immigration of settlers from outside. Different attempts to cultivate these hazard-prone regions led to the occupation of certain areas by mixed populations. Within the 20th century these valleys have experienced population growth rates over average. Intra-montane migration of refugees and settlers in search of cultivable land, sedentarisation of nomads and itinerant traders as well as structural changes in local elite composition and supra-local administration have led in the case of Ishkoman to

[28] Local history ascribes one fortified site to Kirghiz nomads and the other to the early Wakhi settlers. Abgerch commands a location on top of a difficult spur with the advantage of natural defence properties.

[29] Population data for the Abgerch villages have been recorded from different sources: Government of Pakistan (1975, 1984), LEITNER (1891, p. 246), PAL (1928, 1934). In 1921 the number of households in Morkhun amounted to 10, in 1972 to 42, and in 1991 to 47 (own survey). Out of these 41 households belonged to the Abgerch kinship group while two had migrated from Gulmit and two from Afghan Wakhan respectively.

extra-ordinary population growth and a multi-ethnic settlement structure, which is a characteristic feature of all Hindukush – Karakoram valleys. The expansion of settlements into formerly barren tracts has resulted in increased vulnerability of habitations and risk of hazards, as less secure sites have to be selected.

In a given environmental framework like this short-lived events of mountain hazards affect the daily struggle for survival, but play a minor role in the explanation of population growth in this mountain region. Socio-economic and historic-political factors have been instrumental in the settlement and migration processes. To sustain the present population in the Northern Areas has afforded the exchange of workforce for material goods between highlands and lowlands. Other sources of non-agrarian income derive from tourism and trade, army and government services. Basically no valley is self-sufficient in the provision of cereals and other food stuffs anymore. The degree of dependence on external supplies has profoundly increased in tune with the overall integration of the Northern Areas into the mainstream economy of Pakistan. Thus the correlation between resource potential and carrying capacity is weakening while the potential vulnerability of human habitats from natural hazards remains.

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