



**Reconstructing disasters and adaptation scenario of
nineteenth-century Kashmir.**

Journal:	<i>Disasters Journal</i>
Manuscript ID	DISA-Apr-17-2196.R1
Manuscript Type:	Original Article
Keywords:	Cholera, Earthquake, El Niño, Famine, Flood, Historical disasters, Kashmir history, Nineteenth-century

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Abstract

Realistic disaster scenarios are constructed by integrating both natural hazard phenomena and human science sources of information. We profiled 51 historical natural hazard events of nineteenth-century Kashmir, which provide us much better insight into what people were subjected to under severe natural and deprived socioeconomic conditions. Moreover, critical evaluation of historical data revealed that nineteenth-century was stressed with a series of environmental hazards intersected with socioeconomic and political factors which influenced adaptation and augmented the consequences of resulting disasters. Consequently, sequence of disasters over the century led Kashmir society to learn how to live with disasters and minimize risk and more importantly brought about cultural transformation. The very understanding of the natural hazard vulnerability of Kashmir Valley can help to reduce risk arising out of such processes; much needed to guide regional design, planning and can help to direct future policy responses.

Key Words: Cholera, Earthquake, El Niño, Famine, Flood, Historical disasters, Kashmir history, Nineteenth-century

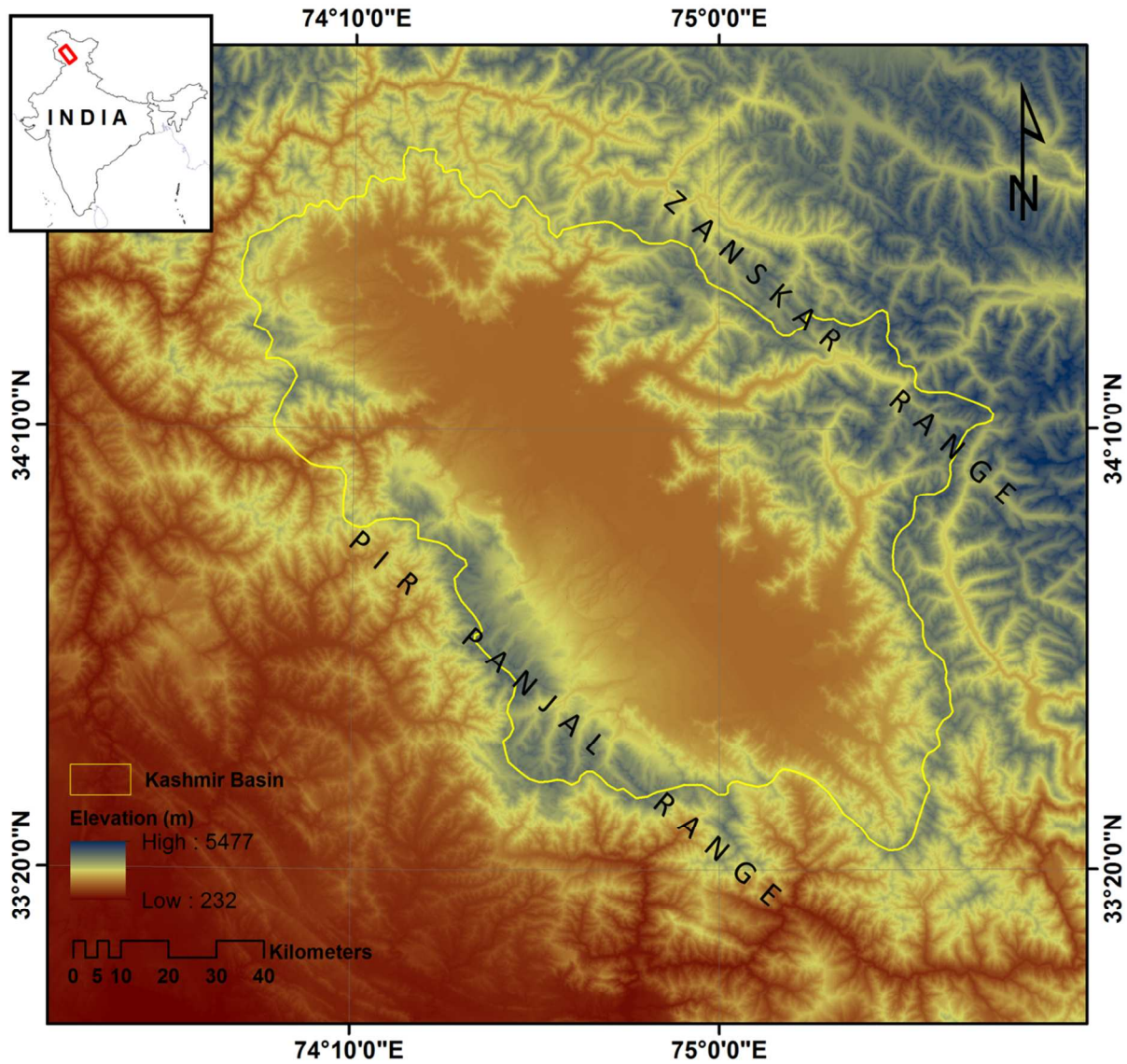
Introduction

Reconstruction of disasters through historical discourse offers a useful window to establish the conditions within which a given hazard takes place and to determine the degree of vulnerability of the affected society. Pattern of vulnerabilities, in association with severe natural hazard resulted in a disaster and as such inevitable subject to be studied from a historical perspective (Gracia-Acosta, 2002). Thus, studies and interpretations of historical events and processes represent a valid back-analysis tool for reconstructing relationship between pre-event pattern of vulnerabilities and societal impact of extreme event; or can be understood as 'societal relationship(s) with nature' (Jahn and Wehling 1998). It is essentially synonymous with 'forensic investigation of disasters' to know the root causes and risk drivers (Burton, 2010; IRDR, 2015); or 'science of past disaster' as anticipated by Felix Riede (2014); aimed at 'charting an historical trajectory of disasters' aptly put by Gregory Bankoff (2007). Consequently, historical research on disasters need to be dealt pragmatically as 'natural experiment of history' (Diamond and Robinson 2010); using disasters as a 'social laboratories' (Grayson and Sheets 1979; Oliver-Smith, 1996); to reveal or disclose the facets underlying certain moments or periods (Gracia-Acosta, 2002). Therefore, historically informed evidence-based narratives of past natural hazards and their human impacts can be brought forward (Riede, 2017); to contribute significantly in mitigation, management and reconstruction efforts and prevent disasters from occurring to at-risk populations (Oliver-Smith and Hoffman, 2002; Schenk, 2014). Consequently, in the preparation of disaster management plans, historical studies represent place specific comparators that can allow particularly sensitive regions to be determined, allowing for an estimation of the most vulnerable groups, individuals and geographical regions (Carter et al., 2007; Coeur and Lang, 2008). In order to have a relatively composite view of the potential range of hazards in a region, a first step towards mitigation is to look back into the past using historical records (Leroy, 2011). Recently, there have been calls within the literature for a greater research focus on the responses of societies to historical disasters (Adamson, 2014; Fazey, et al., 2015; Riede, 2015; Bavel & Curtis, 2016). However, within Indian subcontinent, empirical data on social responses to natural disasters in the past remains relatively thin. With a few exceptions (see for review D'Souza, 2006; Roy, 2012); studies that do exist, such as the wide literature on famine history of India (cf.

Loveday, 1913; Bhatia, 1991; Fagan, 2000; Davis, 2001), are generally detached from vulnerability, adaptation or resilience approaches, reflective of the differing epistemological standpoint between historians and contemporary development/adaptation research. It is in this context, that we resort to historical archives to understand exposure, vulnerability, adaptive strategies of the people and their response to changing environmental conditions transpiring over nineteenth-century Kashmir. Professional approach of historiography based on convergence of coeval, contemporary and retrospective archival sources has allowed us to extract information pertaining to natural hazard events and their intersection with social, environmental, cultural, political, economic and physical processes. It exhibits the continuing need to use history in the field by showing that history has not yet been surpassed and is still part of our present (Palerm, 1980); and can be efficiently and effectively used to prepare for the future calamities (Riede, 2014; 2017).

Study Area

Located in northwest Himalaya, Kashmir Valley is embedded by the flanks of mountain ranges i.e., Zaskar (~6000m amsl) and Pir Panjal (~5000m amsl) on north-northeast and south-southwest respectively (Fig.1). Contrary, the valley floor drops to a minimum elevation of ~1570m amsl and provides congenial conditions for human habitation. In general the valley is spread over three major physiographic division i.e., mountains, Karewa uplands (Plio-Pleistocene deposits), and floodplain. A characteristic feature of valley floor is the presence of trunk river Jhelum which stretches over almost entire length of the valley originating from Verinag in the south. The river Jhelum flowing in northwest direction up to Wular Lake is fed by the waters of all small rivers draining the Kashmir Valley. After its exit from the Wular Lake, the trunk river cuts across the Pir Panjal Range to enter another country (Pakistan). Maximum area of the valley is precipitous, thus making the low lying part exposed to frequent inundation especially during extended hours of precipitation. More than 5.5 million people live in areas prone to multiple risks posed by various geophysical hazards, including floods and earthquakes. A characteristic feature of the country is its isolation from the rest of the world by a ring of lofty mountains, unbroken except by the narrow gorge of the Jhelum. Kashmir Valley was devoid of road networks during nineteenth-century which could connect it to the rest of undivided India. However, there was only a single cart-road (Jhelum Valley Road) which connects valley with Lahore.



Data sources

Disasters that we were researching occurred during the nineteenth-century—an era serendipitously well documented though characterized by intermittent or discontinuous coverage in time. There was no specific literature dealing with what can be generally termed as disaster studies in the historical perspective. Consequently, information about natural events and resulting processes were littered in the vast corpses of literature, making them difficult to comprehend. There are two types of writings—the first is local descriptive manuscripts documented in the Persian language e.g., *Majmu'-ut-Tawarikh* (Kachru, 1836); *Umdat-ut-Tawarikh* (Suri, 1849); *Wajeez-ul-Tawarikh* (Khanyari, 1857); *Tarikh-i-Hassan*, (Khoihami, 1885) and *Tarikh-i-Kabir Kashmir*, (Miskeen, 1899). These manuscripts have running text describing natural hazards and their socioeconomic impacts; some entries of which are spurious and need to be looked at prudently. Consequently, we resort to vigilant description analysis and comparison. In addition to native historiography, another source material is travel literature (travelogues) documented by many European travelers during their stint in Kashmir. Thus, we have descriptions, by George Forster, (1808); Moorcroft and Trebeck, (1841); Hugel, (1836); Vigne, (1842); Schonberg, (1853); Bates, (1873); Federic Drew (1875); Bellew (1875), followed by Wakefield (1879). Importantly, the great

1 settlement operation of Kashmir initiated by Sir Andrew Wingate in 1887, gave some details of the natural hazards of Kashmir during
2 the nineteenth-century. Later, Walter Lawrence (1895) carried through Wingate's settlement operations by giving a vivid picture of
3 the natural hazards in his book, *The Valley of Kashmir*. The Neve brothers, Arthur and Ernest (medical missionaries in Kashmir),
4 gave their accounts of the land and its people in various travelogues and recorded their first hand observations. The contents of these
5 archival records range from land settlement operations to physiographic and cultural aspects to lengthy narratives of events, often
6 exhibiting characteristics of on-the-spot reporting. In general, we used diverse historical sources (reproduced later in the text) in
7 collating information on natural disasters to assess their authenticity. In spite of the scattered nature of information dispersed across
8 multiple archival sources, we have been able to condense natural hazard events in time and their impact on society spanning over a
9 century.

17 **Disasters: variability and complexity**

19 Meticulous review of archival records enabled us to rediscover spectrum of hazards (Fig. 2) and in some cases their causes, impacts
20 and societal response in Kashmir during nineteenth-century. The period experienced repeated natural hazard events and significant
21 sociopolitical upheavals sometimes occurring concurrently. These natural disasters stem from the complex interaction between
22 hydrometeorological and geophysical events and the society affected by them. In the following analysis, basic trends in annalistic
23 admittances concerning natural hazards were derived from thirty six reliable entries comprising fifty one events (Table1). It should be
24 noted that single entry reports several phenomena, e.g., year, 1803 reveals severe flood followed by famine. Similarly, 1819 indicate
25 earthquake and cholera followed by famine. While as, 1828 witnessed earthquake cholera reminiscent to 1824. Furthermore, 1832
26 indicate flood and famine followed by cholera. Similarly, 1892 indicate cholera followed by drought and earthquake. And finally year
27 1900 witnessed cholera followed by severe flood. Within the region of Kashmir, the following severe events over a 100 year period
28 were studied: 16 cholera epidemics; 10 earthquakes; 13 floods; 07 famines and 05 droughts. Notable statistical variation ranging from
29 32% (epidemics) at the highest followed by floods (26%); earthquakes (20%); famine (14%) and the lowest 8% (drought) of the total
30 number of events.

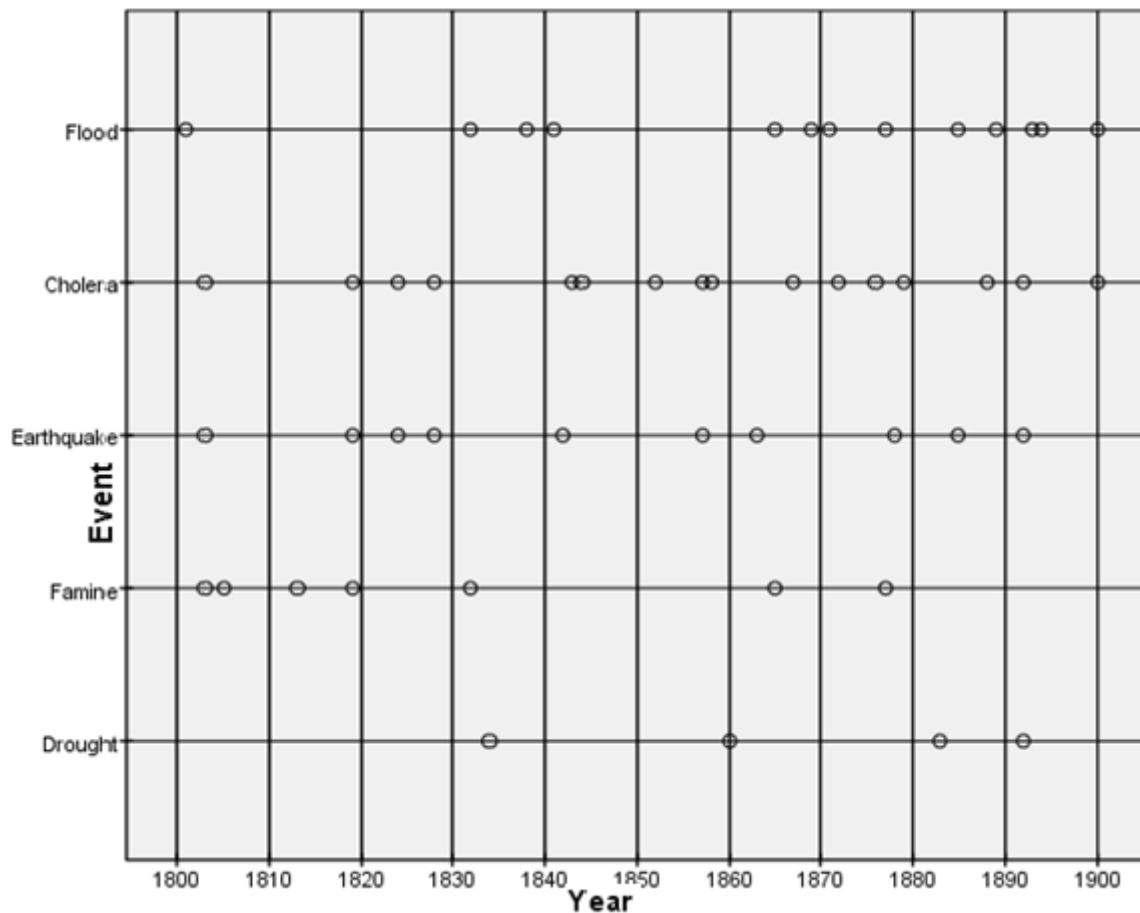


Fig. 2. Showing the time line of occurrence of natural hazard events in Kashmir Valley from 1800-1900.

Table 1. List of hazard events and their societal impacts which occurred during entire nineteenth-century in Kashmir Valley.

Year	Event	Significant Description	Source
1801	Severe flood	Severe flood followed by famine	Majmu'-ut-Tawarikh (1836); Tarikh-i-Kabir Kashmir (1899).
1803	Famine/cholera/earthquake	A great earthquake creating severe ground shaking and ruptures at several places, damage to life and property.	Wajeez-ul-Tawarikh (1857); Tarikh-i-Hassan (1885). Tarikh-i-Kabir Kashmir (1899).
1805	Famine	Excessive cold resulting in immaturity of crops followed by famine.	Majmu'-ut-Tawarikh (1836).
1813	Famine	Excessive cold resulting immaturity of crops followed by famine.	Majmu'-ut-Tawarikh (1836); Tarikh-i-Kabir Kashmir (1871); Tarikh-i-Hassan (1885); Report of Settlement operations of J& K (1888).
1815	Population estimated	800,000	Report of Settlement Operations of J& K (1888).
1819	Earthquake/cholera /famine	Earthquake killed 1200 persons, cholera broke out many Kashmiri's fled the country. Famine aggravated the situation; people sold their sons and daughters.	Majmu'-ut-Tawarikh (1836). Trigonometrical and physical configuration Kashmir (1861); Tarikh-i- Kabir Kashmir (1899).

1	1824	Earthquake/cholera	Great earthquake which laid every house in the city low. During the three months of continuance inhabitants live entirely in tents followed by cholera.	Gazetteer of Kashmir (1873); The Happy Valley (1879); Report of Settlement Operations of J&K (1888); Administrative Report of J&K State 1892-93 (1895).
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7	1828	Earthquake/cholera	Earthquake shook down many great houses, and killed 1000 persons and 1200 houses shaken down. Majority of the people were rendered homeless, naked, hungry weak and uncared for. The corpses of dead littered about which caused cholera killed many more. A census of dead was taken at first, but discontinued when it was found that many thousands had died in 21 day.	Travels in Kashmir (1842); Wajeez-ul-Tawarikh (1857); Tarikh-i-Kabir Kashmir (1871); Tarikh-i-Hassan (1885).
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16	1832	Famine/flood	Heavy autumn rains in 1831 destroyed paddy crop; followed by heavy snowfall in all rivers and lakes were frozen on account of severe cold. A severe famine was caused and events took such a turn that caused very terrific economic crisis. The situation compelled many hungry people to march down to Lahore, Delhi, Calcutta, Banaras and Amritsar. Famine carried off three fourths of the population.	Majmu-át-Tawarikh (1836); Umdat-ut-Tawarikh (1849); Valley of Kashmir (1895).
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26	1834	Drought	Drought caused due to scarcity of rainfall about 70% of the population lived in almost starvation.	Happy Valley (1879); Valley of Kashmir (1895); Indian pages and pictures (1912); A History of Sikh Rule in Kashmir (1977).
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32	1835	Population estimated	200,000 Persons	Valley of Kashmir (1895); Gazetteer of Kashmir (1873).
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35	1838	Great flood	Great flood to which the Kashmir Valley has in all ages been subject, occurred, which forced the inhabitants to take to their boats.	Gazetteer of Kashmir (1873); Condemned Unheard (1890); Geography of Jammu & Kashmir, (1925).
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39	1841	Severe Flood	Severe flood caused damage to life and property including six bridges were swept away from Srinagar.	Gazetteer of Kashmir (1873); Condemned Unheard (1890); Geography of Jammu & Kashmir, (1925).
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44	1842	Earthquake preceded by heavy snowfall	A great snowfall followed by an earthquake.	A History of Sikh Rule in Kashmir (1977).
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47	1843	Cholera epidemic	Continuous rains followed by cholera 23000 died of it.	Condemned Unheard (1890); A History of Sikh Rule in Kashmir (1977).
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51	1844	Cholera epidemic	Continuous rains followed by cholera.	Administrative Report of J&K State 1892-93 (1895).
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54	1852	Cholera epidemic	Continuous rains and ensuing cholera.	Administrative Report of J&K State (1892-93).
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57	1857	Cholera/earthquake	Cholera struck to the valley strange to say through the winter when the snow was up to	Gazetteer of Kashmir (1873); Condemned Unheard, (1890);
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1			the man's neck. Maharaja Gulab Singh's	Valley of Kashmir (1895).
2			day of death was marked by an earthquake.	
3	1858	Cholera epidemic	Many people died	Administrative Report of J&K State 1892-93, (1895).
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6	1860	Drought	Scarcity owing to short water supply.	Condemned Unheard, (1890).
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8	1863	Earthquake	Earthquake followed by aftershocks that lasts for three months.	Tarikh-i-Kabir Kashmir, (1871); Tarikh-i-Hassan, (1885);
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11	1865	Famine/flood	Continuous rains followed by flood and famine people migrated to Punjab.	Handbook of Kashmir, (1888); Guldast-i-Kashmir (1888).
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14	1867	Cholera epidemic	Cholera spread due to incessant rains and bad sanitation.	Administrative Report of J&K State 1892-93 (1895).
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17	1869	Flood	Continuous rains followed by flood.	Condemned Unheard, (1890); Kashgar to Kashmir (1875).
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19	1871	Flood	Continuous rains followed by flood.	Condemned Unheard, (1890).
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21	1872	Cholera epidemic	Cholera spread due to incessant rains and bad sanitation.	Administrative Report of J&K State 1892-93, (1895).
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24	1873	Population estimated	491,846 persons	Census of India (1891).
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26	1876	Cholera epidemic	The intermittent appearance of disease from Dec. 1875-Oct.-1876 wiped out 1276 persons/ Poor harvest.	Administrative Report of J&K State 1892-93 (1895).
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30	1877-8	Flood/Famine/Earthquake	Flood followed by severe famine caused by heavy rains, people died for want of food, leaving behind wives and children to die. Many orphan girls were sold to city people. Three fifth of the entire population of the Valley died.	Tarikh-i-Hassan (1885). Valley of Kashmir (1895).
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37	1878	Population estimated	402700 Persons	Condemned Unheard, (1890). Administrative Report of J&K State 1892-93, (1895); Valley of Kashmir (1895); Geography of Jammu & Kashmir, (1925); Hindu Rulers Muslim Subjects (2004).
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44	1879	Cholera epidemic	Famine followed by cholera	Administrative Report of J&K State 1892-93, (1895).
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46	1880	Cholera epidemic	10,000 people died of cholera	Medical & Surgical practices in Kashmir (1889).
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48				
49	1883	Drought		Hindu Rulers Muslim Subjects, (2004).
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51				
52	1885	Earthquake /flood	39,00 deaths in Kashmir including 20,000 horses, 10,000 cows and oxen followed by a flood.	Geological Survey of India (1885); The Lancet, Sept. (1885); Tarikh-i-Hassan (1885).
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56	1888	Cholera epidemic	Kashmir has been visited by epidemic cholera nearly 10,000 people died.	The British medical journal. Dec. (1900).
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1	1889	Flood	The details regarding this flood are lacking, except that the flood washed away the house of Mr. Bijex, the state engineer.	JK . Pol. No. 39 (1889).
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4	1891	Population estimated	949,041 Persons	Census of India (1891). A Guide for Visitors (1898).
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7	1892	Cholera/drought/earthquake	It is stated by the chief medical officer that 11,712 persons died./ earthquake devastated the women's hospital (1892).	British Medical Journal, Aug. (1893); A Woman's Life for Kashmir Irene Petrie; A Biography (1901); Administrative Report of J&K State 1892-93 (1895).
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13	1893	Severe flood	A severe flood took place in Jehlum owing to continuous rains for 52 hours, followed by cholera, 1000 people died and 2225 houses were wrecked.	Valley of Kashmir (1895); Floods in Jammu and Kashmir (1928).
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18	1894	Severe flood	The year 1894 witnessed an extraordinary and unexpected flood in the month of June river rose to height of about 3 feet below the level recorded the year before.	Administrative Report of J&K State 1894-95, (1896);
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23	1900	Cholera/severe flood	Continuous rains caused cholera and 4225 people died.	Floods in Jammu and Kashmir (1928).
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Cholera epidemics

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27 Cholera struck Kashmir Valley regularly in several discernible waves since the beginning of 1900's. Sudden outbreaks of cholera
28 epidemics during nineteenth-century have been studied by many European visitors and medical missionaries to conclude it as an
29 indigenous owing to insanitary conditions prevailing in Kashmir. An examination of geo-ecological factors led Walter Lawrence
30 (1895) to conclude that villages on the Karewa Plateaus (Pleistocene uplands) seemed free from cholera, contrary to alluvial plains
31 where the disease was most widespread. Since the alkaline (ph value of ~ 7.5) nature of Karewa soils, inhibit the growth and spread of
32 cholera vibros on Karewa uplands (Akhtar, 2008). Conversely, the center and nursery of cholera in Kashmir was the foul and squalid
33 low lying capital of Srinagar, from where it spread to dirty towns and villages (Lawrence, 1895 p.219). Slush, filth and ordure washed
34 in the river and stagnant water bodies converted into string of cesspool fitted for the reception and fostering of cholera germ
35 (Lawrence, 1895 p.36). Eventually, insanitary conditions developed and spread by dirty habits of the people was the main cause of
36 explosive nature of the cholera outbreaks (Climo, 1888; Wilson, 1900; Biscoe, 1921); rain appear to favor the spread of this disease in
37 the low-lying areas (Neve, 1900); contiguous tainted waters and human sources played a contributory role (Elmslie, 1875). Apart from
38 geo-ecological factors, the cholera epidemic was brought to Kashmir as a result of population mobility and troop movement between
39 Kashmir and Punjab, owing to the opening of road between Baramulla and Punjab (Lawrence, 1895 p 200). The outbreak of disease
40 was further intensified by the contacts between Kashmir with cholera prone regions of Jammu during Dogra rule killing nearly 10,000
41 persons in 1880 (Mitra 1889). Besides endemic nature of cholera epidemics in Kashmir, F. N. Macnamara (1880) provided evidence
42 of pandemic nature of this disease and its movement from Bengal via Punjab thence to northwest provinces. Because of Kashmir's
43 connection with Punjab, cholera moved to valley during winter months especially in 1857 (Bates, 1873); and later in the year, 1888
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cholera epidemic emerged in Kashmir leading to 18000 attacks and total mortality of nearly 10000; in 1892 the official returns show 16845 cases, with 11,712 deaths; and finally in the year 1900 there had been 76,000 attacks and 4229 deaths (Neve, 1900). Complementing earlier findings, F. G. Clemow (1903) opined that the cholera has always erupted from India in the lower Ganges Valley in four epidemics waves in the nineteenth-century with sudden and widespread mortality throughout the world. Moreover, several recent studies have established the relationship between short-term climatic variation (El Niño/Southern Oscillation, ENSO) and the occurrence of infectious diseases, in particular the influence of the El Niño/Southern Oscillation (ENSO) on the transmission of vector and non-vector-borne diseases as malaria, dengue fever, cholera (Colwell, 2004; Anyamba et al., 2006; McMichael et al., 2006); with the unusually heavy rainfall and severe flooding from ENSO events playing a contributory factor in disease transmission representing a long-distance 'biological corridor' between Asia and the Americas with global ramifications (Martinez-Urtaza, 2016). Historical records reveal that emergence of cholera during nineteenth-century was concurrent in both time and space with the occurrence of significant El Nino episodes (Davis, 2001); and its endemic effects on Kashmir during 1858, 1867, 1876, 1880, 1888 and 1892. Under such conditions, the schools and offices in Kashmir were closed and the people got onto their houses, waiting to die (Biscoe, 1922). They went only to *Hakim* or trust to prayers and incantations of the priests (Biscoe, 1922) for their *Tawiz* (Mascot) and took no precautionary measures.

Hydrometeorological hazards

Nineteenth-century Kashmir witnessed extreme hydrometeorological (intermediate) events in the form of intense cold, incessant rains, untimely snowfall, and severe flooding, intermittent with mega droughts in 1834; 1859-60; 1883 and 1892 representing 34% of all natural disasters. Year 1805 registered extreme cold resulting in crop failure and ensuing famine, followed by a long intense cold decade (1810-1819); probably the coldest during the last five hundred years (Briffa et al., 1998); synchronous with global cooling effects (Dai et al., 2009). A search through flood history reveals many occasions (e.g., 1838, 1841, 1893 and 1894) when rapid rise in water level rather than peak discharge was primarily responsible for flood deaths. While as, year 1801 1832, 1865, 1869, 1871, 1878, 1889 and 1900 witnessed incessant rains and severe floods which provide serious risks to people trapped in their homes and work places which caused damage to property; nevertheless, provide ample response time to people to move to safer places. Moreover, most of these documented floods were primarily of meteorological origin. However, the flood of 1885 resulted from earthquake triggered landslides which blocked the river Jhelum at many places along its course causing damming (Khoihami, 1885). The largest floods in terms of peak discharge were the flood of 1841 followed by 1893. Calibrating our event-based nature of data against the historical chronology of ENSO events provided by Quinn et al., (1987; 1992); Davis (2001); Gergis and Fowler (2006); Gergis et al., 2009; it should be noted that the history of occurrence of these extreme hydrometeorological events e.g., 1801, 1832, 1838, 1841, 1859-60, 1865, 1871, 1877/78, 1892, 1893, and 1900 reveals a remarkably strong synchronicity with global (very strong) ENSO conditions in the tropical pacific; affecting Asian monsoon's repeated tendency for extending dry and wet extremes with distinct spatial flavors of response (Cook et al., 2010). These ENSO conditions were characterized by monsoon failure and drought over India and Southeast

1 Asia; whereas, Kashmir Valley experienced anomalously wet conditions. Contrary to flooding, drought of 1892 reduced vineyard
2 cultivation by 80% and equally affected the agrarian population of Kashmir (Ram, 1895). Consequently, extreme hydrometeorological
3 (intermediate) events affected Kashmir society in an impervasive way, exhausted their stores and destroyed their assets. From the
4 exegesis of documentary data, it is apparent that the area lying on the left bank of the river was found to be more vulnerable to
5 inundation than that of the right bank. From the scenario of the water surface elevations, it can be clearly inferred that the maximum
6 portion of the available embankments of the river gets overflowed, which shows the necessity of construction of engineering
7 structures such as dykes and levees along the river channel. Following the flood of 1893 the state has started protective works against
8 the floods. In 1901 a spill channel was excavated which takes a large portion of flood water from the Jhelum above Srinagar through a
9 swamp rejoining the river at some distance below the city, and this has proved to be of much benefit in protecting Srinagar from
10 floods. Dredging works have since 1907 been started from Baramulla up to the Wular Lake which have minimized the chances of
11 floods in the Valley and besides have reclaimed many swamps for agriculture (Dev., 1983).

21 Earthquakes

22 A series of seismic (intensive) events that had been felt in Kashmir Valley during the nineteenth-century reveals important information
23 about their occurrence and felt area. These earthquakes occurred in close space-and-time sequences; for example, the seismic events of
24 1824, 1863, 1877/ 1878, and 1885 had their origin within the Valley (Ahmad et. al., 2009). The marked tendency of these seismic
25 events to cluster in space around northwest Kashmir Valley clearly depicts source zone of historical earthquakes and impelled natives
26 to coin and give currency to the word "*watrubunil*" in the local parlance. The subtext of word "*watrubunil*" is clearly given by Pir
27 Ghulam Hassan Khoihami in his book *Tarikh-i-Hassan* (1885), comprising of '*watru*' and '*bunil*' which means 'north' and 'earthquake'
28 respectively. While as, the rest of sequence e.g., earthquake of Garwhal in 1803, Allahbund in 1819, and Afghanistan in 1842 and
29 1892 were felt widely as far as the Kashmir Valley causing damage to natural and built environment (Ahmad et al., 2015). The
30 earthquake of 1824 is mentioned by Bates (1873), as "*..for in 1824 terrible earthquake occurred followed by cholera the inhabitants*
31 *live entirely in tents....the great earthquake which laid every house in the city low.*" Similar mention is made by Paremu (1977) in his
32 book, *A History of Sikh Rule in Kashmir*, quoting from *Gulzar-i-Kashmir*, (Ram, 1870) and *Tarikh-i-Kashmir*, (Merjanpuri, 1871).
33 Similarly, earthquake of 1828 is briefly mentioned in *Wajeez-ul-Tawarikh* (Khanyari, 1857), *Tarikh-i-Kabir Kashmir* (Miskeen, 1899)
34 and *Tarikh-i-Hassan* (Khoihami, 1885). However, G. T. Vigne (1842) has given a greater details as, '*On the night of 26th June, 1828*
35 *a very severe shock which shook down many a great houses, and killed 1000 persons, and 1200 houses shaken down; although, being*
36 *built with a wooden framework, the houses are less liable to fall than an edifice of brick or stone*'. During the early nineteenth-century,
37 Moorcroft and Trebeck (1841), visited Kashmir in 1823 and documented their observations regarding the general construction of
38 houses and states, '*The peculiarity of their construction was, no doubt, suggested by the occurrence of earthquakes, which are*
39 *frequent in Kashmir, though not very violent*'. '*The houses are mostly two storied, and they have a framework of wood filled in with*
40 *sun-dried or, in the better houses, with red kiln-baked bricks. Under the thatched roofs is an airy space with stores of grass and*
41

firewood', remarks Ernest Neve (1913). Lately, seismic event of 1885 is mentioned in Tarikh-i-Kabir Kashmir ((Miskeen, 1899) and Tarikh-i-Hassan (Khoihami, 1885). Moreover, there is a first-hand account of this earthquake by Neve Brothers (medical missionaries in Kashmir) Arthur Neve (1885; 1913) and Ernest Neve (1928; 1900), too has written about it in his book 'A Crusader in Kashmir'; so has Walter R. Lawrence, the British revenue officer in Kashmir (1895). The 1885 Baramulla earthquake caused total destruction and leveled all houses in Sopore and Baramulla. The destructive effects of this earthquake were considerable over an area of 1000 km² (Jones, 1885). The number of casualties reported was 3500 (Lawrence, 1895). About 30,000 animals or cattle died (Miskeen,1900; Bamzai,1962). In addition to the loss and damage reported to the human and built environment. Walter Lawrence (1895), an eye witness to the 1885 Baramulla earthquake, recorded the perception of people about traditional architecture and states, *'The inhabitants of the valley claim that the apparently frail structures escape when heavier and more massive buildings would succumb'*. Similar observations were recorded by Frederic Drew in 1875, *'.... wood and brick building of two, three, or at most four stories with frame work of wood which confines the brickwork of the walls. These mixed modes of construction are said to be better as against earthquakes which in this country occur with severity than more solid masonry, which would crack'*. Walter Lawrence (1895, pp.118-19), further states, *'Just as the style of houses in Srinagar lends itself conflagration, so does its very frailty enable it to bend before the shocks of the earthquakes'*. Historical discourse reveal that owing to abundance of wood houses were built of timber laid on each other to form a square, their interstices filled with bricks and clay in the form of *'Deji-i-Dewari'* and *Taqq* or mixed mode construction (Fig. 3). *'Deji-i-Dewari'* and *'Taqq'* accounts for the considerable success in withstanding seismic shocks to reduce seismic risk (Forester, 1808; Vigne, 1842; Moorcroft and Trebeck, 1841; Drew, 1875; Wakefield, 1879; Lawrence, 1895 and Neve, 1913).



Fig. 3. Referred to as *Taqq* construction. This system of architecture was prevalent during nineteenth-century consisting of load-bearing masonry piers and infill walls with wood "runners" at each floor level used to tie the walls together with the floors.

People in Kashmir were more action oriented, displayed more adaptive behavior when faced with earthquake hazard and were more willing to accept available technology, reflects resource use options and risk management strategies (Fig. 4). However, the people in villages were living in huts with thatched roofs in a miserable conditions and the villagers were equally miserably filthy and dirty (Del Mar, 1906).



Fig. 4. Men at work together using a cross-cut saw. Use of this locally available technology is still common in the villages of Kashmir Valley.

Famines

Numerous famines occurred in Kashmir throughout the 19th century, and their victims were often counted innumerable. This section will enable consideration of whether the famines were brought about by extreme exogenous factors (climatic perturbations), or whether long-standing problems were getting worse prior to the famine, as well as of its long-term consequences. Ideally then, it would be useful to know as much as possible about the Kashmir's land rights, land revenue, cultivation patterns: how large an area was cultivated, by whom, with what crops, using what tools and labour (both human and bovine), on what quality of soil, making what profits and faced by what obstacles to production and profit, including unreliability of rainfall, diseconomies of scale and structures of exploitation that prevented reinvestment. Plenty of aggregate information exists on most of these subjects, but it reveals little about the particular experiences of individual *ryot* (peasant) households.

Land occupancy rights

From the time of Mughals onwards, *Zamindars* had possessed the undisputed right to cultivate and hold land. Francois Bernier (1656–1668) remarked that “....the rents are paid to the King who is the absolute Lord of all the land of his empire.....” Similarly, Mushtaq Kaw, (2001) argues that ownership of whole land vested with the ruler in Mughal India—an assertion that obviously implied the negation of private ownership on land, etc. George Forster (1808) who visited Kashmir during 1782–84 has meticulously equated the relations of the King and his subjects with that of the master and his servants. William Moorcroft and George Trebeck (1841) who happened to be in Kashmir in the first quarter of the century opined that “.....the whole of the land in Kashmir is considered to have been out of mind, the property of the ruler.” Baron Charles Hugel (1845) and G. T. Vigne (1842) also have subscribed the same contention that land was the property of the state headed by King. Consequently, peasants enjoyed the occupancy rights only so long as they paid the government dues and in the event of their failure to pay, they could be ejected (Collet, 1884). The peasants did not enjoy the rights of sale or mortgage of their land (Neve, 1913). The peasant in Kashmir was no better than an agricultural machine in

possession neither of propriety rights nor often occupancy rights (Galancy Commission Report, 1933). The village aristocracy comprised of Hindu landowners (Vivek, 1890; Korbel, 1954), where the Muslim peasants were toiling sons of the soil (Bazaz, 1941), who had to pay such high taxes that economic crises bordering on starvation became more or less a regular affair (Korbel, 1954). Most of the peasants were landless labourers working as serfs of the absentee landlords (Knight, 1893). Such a tyrannical policy resulted in the negligence of the cultivation of land, the revenue could not be paid and the people moved from village to village to escape oppression (Lawrence, 1895). Thus, the peasants in the valley were holding the land as *Haq-i-Assami* or tenants at will (Wingate, 1888). Abul-ul-Fazl's account is the first which presents us with systematic account of Kashmir's Parganas as per the fiscal requirements or administrative purposes (Stein, 1899). The number of Parganas had changed but little during Mughal and Afghan times. Sikhs on their conquest of valley seemed to have found thirty six as the accepted traditional number. But there had been various changes in the names and extent of these Parganas. These changes became still more frequent under the Sikh administration, as is seen by a comparison of list given by Moorcroft and Trebeck, (1825), Baron Hugal (1836) and Vigne (1842). They all show a total of thirty six Parganas, but differ from each other in the names of individual Parganas. As per topographical survey conducted by Charles Bates (1873) a total of forty three Parganas for the year 1865 was found in Kashmir; consisting of 2462 villages having total area of 817,384 acres or 1278 square miles (Wingate, 1888). However, later census report of 1891 the number of villages in Kashmir was then reckoned as 2870. Moreover, in 1852 the Valley of Kashmir was divided into seven divisions for the purpose of revenue administration and for inducing the peasants to cultivate the land under the watchdog of sepoy (Qamar-ud-Din, 1860). Not more than about one-sixteenth of the cultivable surface was under cultivation (Moorcroft and Trebeck, 1823; Wingate, 1888; Digby, 1890). The class of soils recognized by the Kashmiris was many in number. According to Wingate (1888) the four classes of soils known to them were: (i) Abi (irrigated) (ii) Sambher (sailabi) (iii) Nambal (swampy) and (iv) Khushki (dry). The Kashmiri peasant used simple and primitive agricultural implements which were only few, a light wooden plough was the chief tool used in agriculture, plough-share being tipped with iron. The spade was used by the cultivator for digging out turf clods and arranging his field for irrigation. The pestle and mortar was used for husking rice and pounding maize (Lawrence, 1895). The other method of husking rice prevalent in some villages was under a heavy log hammer, which worked on a pivot and was raised by men who stepped on and stepped off the end away from the hammer (Lawrence, 1895). The system of cultivation in Kashmir was *Ek-Fasli* (single crop) because the climate of the valley did not allow the double harvest (Drew, 1875). The crops cultivated were divided into two broad groups, the Rabi: (barley, wheat, rape seed, mustard, cotton, grams, beans, linseed, and lentils) and Kharif: (rice, pulses, water chestnuts, maize and saffron) crops. The government share was collected mostly in kind at the end of both the harvests (Temple, 1887).

Land revenue assessment

The peasant had to pay two kinds of revenues, the legitimate one known as '*Koul*' and the illegal known as '*Rasum*'. Rasum was the prerequisites enjoyed by the officials who kept a list of the items falling under the head (Lawrence, 1895). In early Hindu period land revenue (Koul) was paid in kind (Kalhana, 1148) which was one-sixth of the gross produce (Lawrence, 1895). During the Muslim rule

1 the demand on land was increased to one-half (Hassan, 1959). The Afghans raised their share reducing the share of the peasants,
2 whose rights were set aside, and they were robbed of their production (Khoihami, 1885). During the Sikh rule, the state took a half
3 share and in addition four Traks per Kharwar (Wingate, 1888) of Kharif crop. People were exorbitantly taxed amounting sometimes to
4 nine-tenths of the whole harvest by the Sikh government, and subjected to every kind of extortion and oppression by its officials (Suri,
5 1961). There existed a chain of revenue officials between the peasant and the state to collect the assessed revenue. The *Patwari* and
6 *Kanungo* got 1/2 a Trak per Kharwar between them. “*Nazrana*” was levied four times a year, and “*Tambol*” (about two percent) was
7 taken on occasions of marriages in the ruler’s family etc. (Ganeshi Lal, 1846). The villagers had also to feed the state-watchers of the
8 grain called “*Shakdar*”. Under the above the state share was not less than 3/5th of the gross produce and what the cultivator actually
9 retained was certainly less than 2/5th and probably only about 1/3rd (Wingate, 1888). The authorized revenue demand during the
10 nineteenth century was no doubt one-half; however, with the advent of Dogra regime, Ghulab Singh enlarged an already burdensome
11 taxation system from the pre-Dogra period to such an extent that his rapacity and avarice assumed legendary proportions (Rai, 2004).
12 Ghulab Singh imposed a capitation tax on every individual practicing any labour, trade, profession or employment, collected daily
13 (Singh, 1988). Grain trade in Kashmir was a rigid state monopoly, the government being the seller of its own share of the grain, from
14 its own store houses (Administrative Report, 1878-79). Producers of *shali* (unwinowed rice), the staple crop of Kashmir, were coerced
15 into yielding at least 50 percent of their harvest (Hodson, 1886), and the maharaja monopolized all trade in the Valley, ‘from firewood
16 to taking two-thirds of the singhara (water chestnut) which formed the chief portion of food for many Kashmiris’ (Lawrence, 1895).
17 As a result of harsh regime of taxation, the cultivation was neglected and peasants left their villages and abandoned the cultivation of
18 lands (Saif-ud-Din, 1848). However, to dissuade them from quitting their fields, the government raised the fee ‘on the transfer of land’
19 so that it was equal ‘to the amount for which it was sold’ (Singh, 1988). In 1859 the land was farmed out to the persons known as
20 “*Kardars*” (Wingate, 1888; Lawrence, 1895), who arranged the cultivation of estates. It was the duty of *Kardars* to collect the revenue
21 from the cultivators with the help of *Shakdar* and *Sazawals* using military force “*Nizamati Paltan*” which proved to be completely
22 unsatisfactory (Qamar-ud-Din, 1860). The state reduced its share to a little over one half in 1860 but this concession brought more
23 harm than good to the peasants (Lawrence, 1895). In 1865 the extra Traks per Kharwar were reduced for all *Pandits* and *Peerzadas* to
24 one Trak (Wingate, 1888). In 1869 contract was directly entered into with the *Mukadams* or with the *zamindars* and only two extra
25 Traks came to be levied instead of four. Another system came in to being namely “*Chaklabandi*”, under which agricultural land were
26 divided in to chaklas (three to four villages forming one chakla) and was allotted on revenue contracts for three years (Akhtar, 2007).
27 These Chakaldars robbed the peasants as well as the state (Qamar-ud-Din 1860). In 1873-74 the village contracts were divided in to
28 “*assamiwar khewats*” or cultivator account for three years (Lawrence, 1895). When in 1877 the scarcity began, the contracts broke
29 down and in 1880 a new *assamiwar khewats* was made which was based on the cash or kind collections of the previous years, known
30 as cash, settlement; though it was only in name a cash settlement and it depended on the higher authorities to decide yearly how much
31 to take in kind and how much in cash (Lawrence, 1895). In 1882 a new experiment of revenue ‘*Izad Boli*’ (auctioning villages) was
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brought into force. Under this system the villages were auctioned to the highest bidder among the Pandit contractors after the fields were examined by "*Nazardia*" or eye survey (Hanvey, 1883). These bidders would bid for the villages without taking into consideration the capacity of the villages (Lawrence, 1895) to pay the ' amount of the bidder. Even during the bad harvests the bidders would wring all they could out of the villagers and paid not a single rupee to the state. Even the sums offered at the time of auction could never be taken out of wretched villagers (Vivek, 1890). As such both the cultivator and the official concerned became the bakidars (defaulters) of revenue to the state. The Bakidar or defaulter list comprised "nearly everyone in the state from the Prime-Minister downwards" (Hanvey, 1883; Vivek, 1890). The bakidars existed before 1851 when Maharaja Ghulab Singh ordered the remission of certain revenue arrears on the improvised cultivators later, on the bakidars of revenue were severely punished (Saif-ud-Din 1846) picking out the beard hair by heir arresting the relatives and even their women folk (Saif-ud-Din 1848). The bakidars were chained, exiled and even killed in the prison. Sometimes, owing to the severities imposed on these people, they were compelled to commit suicide (Saif-ud-Din 1846). Thus there was an absence of any settled land-revenue system; one system followed the other each being faultier than the previous one. The mode of collection was haphazard (Wingate, 1888). In Kashmir the crops were usually divided on the ground in such a manner that both the ruler and the ruled were at the risk of loss. As a common practice the circles of villages were let out to the contractors who were assisted by a chain of officials (Vivek, 1890). When the crops were ready there used to be a dispute as to whether the crops were such that the contractor could fulfill his engagements. When the crops were ready the government would put its watch-dogs (Shakdar) to keep the peasant away from his crops and subjected him severe penalties if he dared to use little crop for his use (Beg, 1950), or even if an animal ate a little of the stacked grains the owner of that animal was punished severely (Rai, 2004). If the villagers could not satisfy the government demands they were deprived of their cattle and sheep by the officials as was seen in 1880 (Lawrence, 1895). These officials used to plunder the peasants and embezzle the revenue due to the state (Knight, 1893). The cultivator had neither any right to his land nor to his crops while as the officials and the city population had a right to be well-fed (Wingate, 1888). The revenue system was such that whether the peasant "works much or little he is left with barely enough to get along on till next harvest" (Thorp, 1870). Thus the peasant was a machine to produce for the huge population of the city which resulted in peasants fleeing from their villages leaving the share of the village to be paid by their neighbors who had more land in their hands then they could cultivate and were the worst sufferers for they had to pay the revenue (Knight, 1893). The land had gone-out of cultivation in about 252 (two hundred fifty two) villages thus as a result the occupancy hereditary rights were very few as the villagers who fail in one tehsil they betake themselves in another (Wingate, 1888). While considering the existing revenue system, 'one wonders that any village should have remained honest in the midst of so much corruption, and wonders too, not that the land revenue rapidly decreased, but that any revenue should have found its way to the state treasury (Lawrence, 1895).

Exactions

1 The Valley had been subjected to exactions since the time of foreign aggressions. The Mughal exactions were limited but the brutal
2 Afghan Governors exacted as much money from the Kashmiris as they could. The Sikh rule was no better, Ranjit Singh's most
3 concern was with money no matter how it was collected as the Governors exacted as much as possible and if they failed to deliver the
4 required sum, they were dismissed and forced to pay the money in arrears out of their own pockets (Hugel, 1836). The image of
5 Kashmir as treasury is brought about alive by accounts how all business would come to a halt at the court in Lahore when the tribute
6 from that land of plenty reached there and provide its annual spectacle (Rai, 2004). In the words of G.W. Osborne (1840): "The yearly
7 tribute from Cashemire had arrived, and was, as usual opened and spread upon the floor in the Durbar for inspection of Maharaja. It
8 consisted of shawls, arms, jewels &c., to the amount of upwards of thirty thousand pounds". The people of every profession, even the
9 tailors and barbers were severely taxed (Ganeshi, 1846). The system of exactions and taxation of the pre-Dogra period was not only
10 maintained but also extended in many ways during the Dogra rule. Maharaja Ghulab Singh seemed to consider his purchase of
11 Kashmir as a financial investment, so he was determined to get rich profits from it. He had an immense greed for money (Torrens,
12 1863). The officers were allowed without any restraint to collect the normal tax plus extortionate sums by fleecing the people (Saif-
13 ud-Din, 1846). Maharaja Ghulab Singh used a hundred arts in the extortion of money and also opened the new doors of tyranny
14 (Merjanpuri, 1871). Everything was taxed except "air and water", which was in abundance in the Valley and could, not be
15 brought under taxation (Lawrence, 1895). The Maharaja doubled the price of shali (unhusked rice) from one to two rupees per
16 Kharwar (Khanyari, 1857), which resulted in hoarding and black-marketing and the common scarcity of food. The cultivators had to
17 pay for every hundred Kharwars of shali a permit tax for importing it to Srinagar (Saif-ud-Din 1846). In addition to the land revenue
18 the peasants had to pay traki which was advanced by degree till it reached three eighths of the tenant's shares (Saraf, 1931). The
19 annual tax on singhara (water-chestnuts) was raised from fourteen thousand to a hundred thousand rupees (Khoihami, 1885) and
20 thus these assessments along with the land taxes raised the government annual revenue from about thirty-five lakhs to over forty-
21 six lakhs of rupees (Khanyari, 1857). Thus the peasants had to live by the grace of God because their conditions were completely
22 deteriorating (Saif-ud-Din, 1846). Each house in the village had to pay four to twenty annas as a cess (Vivek (1890). Social
23 ceremonies were also taxed, the right to legalise the marriages was framed out and even the dead could never be buried except by the
24 licensed and privileged grave-diggers (Lawrence, 1895). The duties were also levied on the dried cow-dung used as fuel (Saif-ud-Din,
25 1846). The peasants were also charged duties as temple tax for the maintenance of a charitable kitchen in the name of Gadadharji
26 temple (Saif-ud-Din, 1846), at the same time we get a reference to the imposition of some cess on the Hindu temples (Saif-ud-Din,
27 1846). The social evils like gambling and prostitutions were not only encouraged but also fastened as it yielded a large amount to the
28 government (Saif-ud-Din, 1846). "Rasum-i-Khidmatgaran" was a levy collected for the maintenance of the palace attendants, at the
29 rate of four annas on one hundred rupees (Vivek (1890). and four Traks for a hundred Traks (kind) (Saif-ud-Din, 1858). Rasum-i-
30 Deorhi was collected from Thandars, peasants, and other officials of the Parganas at the rate of two to three hundred rupees (Saif-ud-
31 Din, 1858). The government collected the oil forcibly from the people for the purpose of burning lamps in the palace, government

1 offices and in the main streets (Saif-ud-Din, 1858). It was in 1848 that kitchen gardens were brought under taxation when Sultan (Sula
2 Pahalwan) (the Muqadam of vegetable growers) offered to pay the government annually one thousand two hundred rupees (Rs. 1200)
3 more than the previous year's demand if he was allowed to collect a levy from the vegetable gardens and he collected it at the
4 rate of 4 annas from each kitchen garden known as Rasum-i-Sabzi (Saif-ud-Din, 1858). The barbers who were exempted from taxes
5 traditionally, were now asked to pay the baj and khiraj (Rasum) (Saif-ud-Din, 1858). Many private gardens growing apples, pears and
6 walnuts were confiscated because these fruits had a great demand in Punjab (Saif-ud-Din, 1858). The fruits were taxed at the rate of $\frac{3}{4}$
7^{ths} of the annual produce by the government (Saif-ud-Din, 1858). The owners of animals of the village were equally taxed (Thorp,
8 1870), every keeper of milk cow had to supply one seer of ghee yearly as tax or in cash; it was collected from ten to twenty rupees.
9 Saraf has pointed out that in 1871 circumcision was taxed which brought in six hundred rupees (Rs. 600) as revenue, sale of chinar
10 leaves brought rupees twenty-five and the tax on sheep and goat earned Rs.1,07,311146 . Even the village scavenger had to give a
11 specified number of skills to the government annually, whether or not any animal died in the village (Lawrence, 1895). The peasants
12 sold their oxen and left the villages due to such harsh atrocities and over-exactions (Saif-ud-Din, 1848). Thus nothing escaped the
13 exactions of the government and its officials (Vigne, 1842).

24 **Begar (Forced Labour)**

25 The most characteristic feature of Kashmir administration was the '*Kar-i-begar*' or forced labour. It existed in the valley due to its
26 nature and absence of any proper roads. In ancient Kashmir, the system existed under Sankaravarman in late 9th century A.D and it
27 was known as "rudhebarodhi" who used it for fiscal extortion (Kalhana, 1148). Even during Kalhana's own times the carriage of loads
28 under this system was "the harbinger of misery for the villages" (Kalhana, 1148). A military expedition led by Jayasimha's (1128-1149
29 A.D.), commander Dhaya resulted in a victory at the "expense of human life and human sufferings" (Kalhana, 148). Kalhana refers to
30 thirteen kinds of begar. The system continued under the Sultans, Mughals, Afghans, Sikhs and Dogras (Moorcroft and Trebeck, 1823).
31 The curse of begar fell on the villagers owing to the absence of any laboring population in the Valley (Logan, 1891). The state had
32 every right to call upon the villagers to perform the duty of begar (Lawrence, 1895). The laboring class existed in the cities but the
33 cities, and the non-Muslims were exempted from begar, the cultivators working in jagirs, Dharmarth villages and the tenants working
34 in the land grants of officials (chakdars) were free from the fear of being taken to perform this duty (Lawrence, 1895). Any influential
35 name (official) could protect the villagers from it and some even purchased exemption from 'begar' by bribing the tehsil authorities
36 (Wingate, 1888). So it were the villagers, especially the Muslims peasants who were the victims of the system, and it was
37 regulated on firm basis during the Dogra rule when a number of military expeditions were undertaken towards Gilgit, Astor and
38 other frontier territories (Knight, 1893). There was the necessity on providing the troops on the move and the military establishments in
39 the conquered territories with adequate supplies (Thorp, 1870). Thus it was Ghulab Singh who established a continuous line of supply
40 for the troops in the above-mentioned territories through 'begaris' without any consideration to pay them for their shelter, food and
41 dress (Thorp, 1870). The 'begar' earned the heavy loads in the months of autumn, in normal times, and at any time of the year, if the

1 conditions in the frontier territories were disturbed (Bamzai, 1962).The method of conducting the system was much faultier
2 (Lawrence, 1895). Each house in the village had to furnish the quota of men and they were paid from 4 to 7 chilki rupees for
3 the double journey (Thorp, 1870), by their Kardars, which was rarely paid. These begar coolies carried also government money to
4 other parts as was the case of Hazara when on March, 19, 1849 Ghulab Singh sent sixty thousand rupees (Nanak Shahi) to meet any
5 emergency (Saif-ud-Din 1848). In 1851 about 23,000 agriculturists were collected before the month of April as begaris to carry
6 rations and straighten road from Muzafarabad to Baramulla for British visitors-(Col.H.Lawrence accompanied by Sir Henry
7 Elliot, Foreign Secretary and others) (Saif-ud-Din 1848). Ghulab Singh encouraged begar and collected in hundreds and thousands
8 of agriculturists to perform this job (Saif-ud-Din 1848). In 1851 A.D about 30,000 persons were enlisted to perform Begar to Chillas
9 (Saif-ud-Din 1848) and four hundred persons were caught from Jamia Masjid while performing Friday prayers (Saif-ud-Din 1848).
10 Even the children were collected but some of them were subsequently released (Saif-ud-Din 1848). Many persons escaped in large
11 numbers to Peshawar, Rajouri and hilly regions (Saif-ud-Din 1848). The fields of those agriculturists, remained unattended, who were
12 sent with supplies to Chillas "Shali" produce was reduced by half which showed the symptoms of the approaching of famine".
13 Immediately, there was a great scarcity of food (Saif-ud-Din 1848). The Kashmiri peasants were the worst sufferers whenever any
14 disturbance took place at Gilgit (Neve, 1918) necessitating the presence of increased number of troops there. In 1853 Mian Ranbir
15 Singh confessed in the open court that he collected two thousand coolies from peasants to carry rice to Gilgit (eight Traks/man) and by
16 25th May, 1856, the (begar) coolies had carried 1,172 Kharwars of rice and grain to Hazara and Bunji for transmission to Gilgit
17 for the campaign (Saif-ud-Din, 1848). During the summer of 1866 an unusual number of troops was to be sent to Gilgat, so the
18 peasants, boatmen and tradesmen were caught to carry their supplies and baggage, sent in a hurry without the slightest provision being
19 made for their lodgings, clothing or subsistence on the road "except one seer of rice for a day as their food (Thorp, 1870) and as
20 payment". A large number of them died on the occasion at the Gilgit Road, and the next batch was sent in the late autumn of 1866
21 with supplies on their backs but many of them died on the road due to cold and hunger. The authorities, however, continued
22 sending the men-folk to a country through stony roads, which were covered with snow during winter season. The poor folk died
23 enroute for want of good arrangements by the government (Saif-ud-Din, 1848). The name 'Gilgit' struck terror in the heart of a
24 Kashmiri. It meant to him "forced labour, frost-bite on the lofty passes, and Valleys of death" (Neve, 1913). When it was rumored that
25 begaris were to be sent to Gilgit the villagers left for hills to protect themselves from the ghastly Gilgit (Norris, 1932). The villagers
26 were torn from their homes to die in the snow of Gilgit and to transport the fruits of their own labour to Gilgit. Inhuman punishments
27 were dealt out to those who demurred to leaving their homes for two or three months with the prospect of death from cold or
28 starvation (Lawrence, 1895). It was a miracle if some-one survived those routes and if any porter slipped down the precipice or
29 fell ill, he was left to die or as a prey to vultures and beasts, and the caravan moved on (Neve, 1913). While many others encouraged
30 each other with the word of hope but it were only a few who survived thinking of their loved ones (Thorp, 1870). All these hardships
31 were levied on the Muslim farmers who were the harmless subjects of the Maharaja (Knight, 1893) the oppression through begar on
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1 peasants was much more than the extortion of the tax collections which left a little subsistence allowance to them or left them to live
2 on fruits and vegetables but this institution meant a separation for the villagers from their families and more than that caused them life-
3 long torture and death (Knight, 1893). The absence of peasants, from their fields during the sowing or ripening time, caused the
4 agriculture to decline and scarcity became prevalent which was a loss both to the cultivator and the colonial government (Khoihami,
5 1885; Knight, 1893). However in 1890-91 an opportunity was taken to minimize the impressment of begar coolies (Administrative
6 Report, 1890-91), but its hardships on peasants were present even in 1913 when they were taken as begar coolies to Pahalgam
7 (Administrative Report, 1890). The State Council passed a resolution (No: XV, August 22, 1922) for its stoppage in 1923; but even in
8 1925-26 it was present in the frontier province (Administrative Report, 1925-26).

15 **Colonial famine responses**

17 Colonial famine response in the Kashmir can broadly be categorized into different phases, largely concurrent with the change of rule
18 from one colony to another. During the Afghan rule, the system of Mughal was generally adopted but their exactions appear to have
19 been rather heavy. According to George Forster (1808) who visited Kashmir in 1783, states that revenue of between twenty to thirty
20 lakhs of rupees was collected from Kashmir, of which a tribute of seven lakhs was remitted to treasury. A portion of this tribute was
21 transmitted to the Afghan capital at Kabul in Shawl goods. Izzatullah Mir (1872) during his visit to valley in 1812-13 notes that ten
22 lakhs of rupees per annum were realized by duty on every boat-load of rice. The Kharwar of shali (unhusked rice) which in times of
23 abundance was available for the trifling cost of little hen (Kachru, 1836) was obtained in famine of 1813 for as high a price as fifteen
24 rupees (Khoihami, 1885). People lamented on the streets for want of morsel of food, often worth its weight in gold (Kachru, 1836).
25 Many mothers were rendered destitute and having no means of nourishing their children exposed them for sale in the public places of
26 the city (Kachru, 1836). Unlike their predecessors the Afghans took no long term measures to mitigate the effects of famines; there are
27 apparently no references to remission of land tax, in full or part, on the crops damaged by climatic perturbations. Lastly, the land tax
28 structure was also instrumental in unleashing food scarcity and that too when there was seemingly no crop-failure.

30 In 1819 when Sikhs took over Kashmir from Afghans, peasantry was exposed to great strains due to excessive cold resulting
31 immaturity of crops, perished food and livestock, famine aggravated the situation; people sold their sons and daughters (Kachru, 1836;
32 Miskeen, 1899). The famine of 1831 began with the sudden, heavy and untimely autumn snowfall resulting in death of domestic
33 animals and cattle and people suffered for water and fuel (Paremu, 1977); proceeded by the winter of 1832 all rivers and lakes were
34 frozen hard which destroyed paddy crops resulted in devastated famine known by the name of *Sher Singh*, [the then governor of
35 Kashmir] (Kachru, 1836); which lasted for three years and later followed by a drought in 1834 (Paremu, 1977). The combined effect
36 of inapt administration, exaction and famine in 1831 was to reduce Kashmir once more to the depths of distress. The prices of eatables
37 went up ten to fifteen times their normal price; parents sold their children for want of food (Merjanpuri, 1871). The situation
38 compelled many people to migrate from their homes, many died on the way, unwept, unburied and unsung (Sufi, 1948). Those who
39 survived gathered in different parts (Amritsar, Delhi, Calcutta, Banaras and Lahore) of undivided India. Moorcroft, (1841) speaking of

1 those days, refers to the deserted condition of villages, and to the exorbitant taxes, amounting sometimes to nine-tenths of the whole
2 harvest. And he says: "the Sikhs seem to look upon the Kashmiris as little better than cattle. The murder of a native by a Sikh is
3 punished by a fine to the government from sixteen to twenty rupees, of which four rupees are paid to the family of the deceased, if a
4 Hindu and two rupees if he was a Mohammedan." Unpaid forced labour was the rule, and for this purpose people were seized and
5 driven along the roads, tied together with rope, like slave gangs.
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10 In the mid nineteenth-century Kashmir witnessed the most burgeoning historical catastrophic event—the Treaty of Amritsar
11 signed on 16th March, 1846 that legalized the sale of Kashmir along with its people by the British East India Company to a Dogra Raja
12 of Jammu-Ghulab Singh, for an amount of rupees seventy five lakhs. With the advent of Dogra rule, the Maharaja's fiscal measures
13 have aggravated the Kashmiri peasant's conditions to an almost unbearable degree (Rai, 2004). No, wonder, then that Ghulab Singh
14 allowed no one out of his country without a pass or else, his soldiers and zamindars would all bolt. The predatory nature of Ghulab
15 Singh's taxation policies did draw protests and strikes from Kashmir. The autumn of 1848 saw Srinagar's shopkeepers temporarily
16 closing down business and demanding reduced prices on goods sold to them by the government (Rai, 2004). This shut-down was
17 joined in by some industrial workers as well (Saif-ud-Din 1848). These isolated instances of protest were effectively put down by the
18 state, on occasion with particular ruthlessness (Rai, 2004). An event earned particular infamy for Ghulab Singh was of the drowning
19 of an agitator when he was forced to walk across a thinly iced Wular Lake (Saif-ud-Din 1848). Similarly, famine of 1865 was a result
20 of heavy rainfall mixed with official tyranny responsible for the calamity of 1865 (Khoihami, 1885). There occurred a scarcity of food
21 and resulted in a famine of 1865. During that year there was a splendid crop which was gathered but not calculated and the villagers
22 had to starve for weeks together in the sight of their beautiful harvest and perished due to rains (Brinkman, 1867). The Lt. Governor of
23 Punjab over and again reminded the Maharaja to take prompt action and arrange immediate supply of grains. Food grains were
24 imported for the distribution among city people (Akhtar, 2007). The Maharaja is said to have imported one thousand Kharwars of
25 wheat from Punjab and sold it at subsidized rates and in some cases free of charge (Khoihami, 1885). But the villagers were left to
26 suffer and the distressing news of the famine began to be published in the Indian newspapers. The colonial government committed
27 atrocities on the people to suppress the news (Khoihami, 1885). The Zaldagar uprising on April, 29 1865 was a result of governmental
28 atrocities where shawl-bafs died in large number (Miskeen, 1899). Lately, the *Great Famine* of 1877-78 was similarly caused by
29 continuous rains and grasping officials (Biscoe, 1922). The rains fell from October, 1877, till January 1878 and followed by heavy
30 snowfall at a time when rice and maize crops were ripe (Koul, 1925); crops were beaten to ground (Dewan, 77-78). The whole autumn
31 crop was completely destroyed standing in the fields itself. As per existing system of revenue collection, the cultivators were allowed
32 to cut their crops only after the revenue assessment had been on standing crops made by government officials. A large quantity of rice
33 would have been saved if the cultivators had been allowed to cut the crops earlier and carry them (Lawrence, 1895). The officials did
34 not measure the crops until they had been paid the bribes, while the cultivators were not ready to pay excessive imposition and the
35 officials were reluctant to modify their demand (Biscoe, 1922). When the whole quantum of rice got destroyed, the government
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ordered the sale of state stocks at cheap rates, however, the officials in charge did not always sell it to the people who most needed, nor in the quantity did they require (Younghusband, 1890). After the spring of 1878 the government issued an order to make house to house search for seeds (Lawrence, 1895); and the officials ceased the grains from whosoever possessed them (Ansley, 1879). The people hid their grains in the dams, earth or sunk it in the river (Lawrence, 1895). As the winter drew closer, cattle began to die for want of fodder. The people turned to the grasses and the roots of the swamps and forests for food. The people were absolutely demoralized and acted like voracious beasts, each struggling for his own life and the helplessness manifested by the non-burial of corpses (Neve, 1921). Many orphan girls were sold in city, and even people resorted to cannibalism (Koul, 1925). In the famine of 1877-79 there was an enormous loss of life. One authority stated that the population of Srinagar was reduced from 127,400 to 60,000 and others say that of the total population of Valley only two fifths survived (Lawrence, 1895). In June 1879, cholera appeared to aggravate the miseries of the people. The gross corruption in the official classes did not allow distribution of grain ordered by Maharaja or was made inadequately; the poorer Mohammadan classes being unable to obtain sufficient to maintain life, while the richer Pandit official class were allowed to embezzle enormous quantities, reducing the general stock and reaping large profits for themselves (Administrative Report, 1879). Seeing no hope for survival in the valley, people in thousands start fleeing to the adjoining Punjab plains. Their migration was checked by natural and political factors. They had to face hardships as all the mountain routes were rough and dangerous to pass through. Migration according to colonial policy was prohibited; nobody could leave the state territory without prior permission of Maharaja. Hargopal Khasta (1888) informed the British government that in order to stop the Kashmiri from migration nearly one hundred famine stricken people were got drowned into the Wular lake (Ansley, 1879; Miskeen, 1899). Fedric Henry Cooper came to Kashmir to enquire into the matter and even Lord Bishop of Calcutta visited Kashmir, but Robert Thorp (1870) was the man who brought the facts about the persecution of Kashmiris to light as also to the notice of the British government. Famine that devastated the valley of Kashmir in 1877-79 had already prompted serious consideration of the British colonial policy of noninterference in Kashmir. The pressure to do so grew stronger after the 'ill-starred Afghan war of 1878' which made control over the northwestern boundaries of the empire more urgent than ever (Digby, 1890). Lord Ripon (1884) argued that the appointment of Resident in Kashmir was 'called for' both 'by the need of assisting and supervising administrative reforms' but also to obviate disturbances on the Afghan frontier. Based on Indian Famine Commission recommendations (Indian Famine Commission, 1880) different provinces of British India developed provincial Famine Codes suited to varying administrative systems in their regions (Akerkar, 2015). However, such famine codes were never evoked in Kashmir following the 1877-79 countrywide famine.

Discussion

Combining archive material with existing published studies (using both English and Persian-language manuscripts) permits a general overview of the disaster vulnerability and response in nineteenth-century Kashmir, which can generally be characterized into different stages, largely concomitant with the shift of power from one colony to another. These phases of colonialism began with the decline of Mughal Empire where, the local governors of Kashmir became increasingly tyrannical and oppressive, especially to the Hindus (Neve,

1921). But the Afghan rule (1753-1819) is regarded as the worst period of Kashmir history (Sufi, 1948). At last a measure of relief came when Sikhs took over of the Kashmir from Afghans in 1819 in response to an appeal from the people of Kashmir. This change of rule, although an improvement, benefited the Hindus more than the Muslims. And finally, Dogra's overthrew the Sikh regime in 1846—a general plunder and loot ensued upon each invasion (Lawrence, 1895). In the intervening periods, the country experienced numerous natural hazard events in the form of hydrometeorological episodes, famines, epidemics, earthquakes and significant sociopolitical upheavals, sometimes occurring concurrently, wherein every part of the country had its share of misfortune. Within the colonial controlled Kashmir, disaster response was influenced by the nature of event and the risk reduction thereof. With respect to cholera epidemics, Kashmir was devoid of primary health care facilities, under such conditions, people choose to be indoors in the offing to die (Biscoe, 1922). In the immediacy they resort to conventional methods of treatment or trust to prayers and chants of the priests for their *Tawiz* (Mascot) and took no precautionary measures. Similarly, during the floods people relocate their settlements from flood plains to higher elevation to save whatever they could. Contrary, famines in Kashmir portray altogether different scenario amplified by three factors: land policy, food security and welfare support. Land policy in Kashmir was reminiscent to the medieval conditions of exploitation wherein landlord rented the land to the peasants (Wingate, 1888); having irregular revenue system in place (Lawrence, 1895; Korbel, 1954); with heavy taxation and cesses that made the life of producers miserable (Vigne, 1842). The consequences of this system were the abandonment of cultivated land and gradual depopulation of the country. Each of the dynasties who ruled Kashmir tried to hoard wealth and the cultivators ceased to produce the agricultural wealth (Jalali, 1931). As a result, the ryotwari (land revenue system) reduced cultivators' capacity to adapt to adverse environmental and economic conditions that led Wingate (1888) to describe the land system of Kashmir as 'royatwari in ruins'. There was class of petty tenants deeply in distress with no resources in reserve to enable to resist subsistence crises. Drawing analogy of Indian terms to Kashmiri tenures, Lawrence (1895) deemed fit to apply "*ruined royatwari*" the most appropriate description of the land system of Kashmir. With regard to food security, which had its roots in the rural economy contained a hegemonic social structure, maintained by a rigid economic agreements. At the base of this structure were rural labourers (Muslims) and chain of officials (Hindu Pandits), whose upkeep was dependent upon payment in kind from peasants (ryots). This system was maintained by a network of indigenous tax collector/administrators (Mamlatdars), the flow of capital was tied closely to the grain trade, with capital, predominantly in the form of grain, moving from village peasantry through the official hierarchy who financed the ruling classes. The share of the ruler was nominally one-half, but the cultivator has to pay a large number of cesses and dues from his share, so that he does well, even in good years, if he obtains one-fifth of his harvest. Direct feudal relationships (the zamindars system) existed in Kashmir, and were favoured by the colonial governments. Such policies overtly demonstrate complex issues of protection, collaboration, location, politics, and economics that drive decision making in disaster response. For example, the first failure to disaster response was categorized by 'unregulated, anarchic and predatory' markets coupled with colonial ruler's *laissez faire* response which, conveniently, absolved it from responsibility for coping with food crises. By any criterion, the severity of

1 agricultural stagnation in Kashmir and its culmination in widespread poverty in the nineteenth-century caused the food crises which
2 led to drastic famines in the Kashmir over the same period. Land-revenue taxation system eroded peasant entitlements progressively
3 and made them famine prone. Welfare support: Series of environmental changes and associated stresses, fuelled by hazard
4 independent structural constraints that were social, cultural, economic and political adopted by the imposing regimes to further
5 reinforce their colonial rule. Colonial rulers through their oppressive socioeconomic and political policies pulled down the dignity of
6 populace in Kashmir. There is no mention in the archival records of any attempt having been made to mitigate the effects of disasters
7 especially famines. Chronologically there were seven appalling (1803, 1805, 1813, 1819, 1832; 1865; 1877-78) famines, and the
8 historians agreed that famines were caused by scarcity of food owing to crop failure. Traces of disused irrigation and former
9 cultivation, ruins of villages or parts of villages, of bridges, &c., local tradition, all point to a greater prosperity during Mughal
10 and later Afghan rule, which by the end of Sikh rule in 1846 had almost disappeared (Wingate, 1888). These rulers had a
11 deliberate policy to allow the valley to be devastated in order to avoid inducement to any foreign power to invade Kashmir. No
12 welfare schemes were initiated or commenced until the intervention of British imperial administration. However, the closing years
13 of the nineteenth-century (since 1880) were, in respect of economic conditions in the country, so different from the rest of the century
14 that the brief period saw an appreciable demographic recovery owing to good harvest (Wingate, 1888).

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27 The historical records are remarkably lacking in evidence of any disaster mitigation measures taken by the colonial rulers.
28 Instead, institution of 'Begar' (forced labour) and imposition of restrictions upon migration was fastened in order save the state from
29 the loss of revenue (Saif-ud-Din 1848). Hervey (1853) asserted that if each point of exit from Kashmir were not as vigilantly guarded
30 as it was, 'the number of emigrants would be so overpowering; that the province would be entirely depopulated in the course of a year
31 or two.

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37 Nevertheless, people in Kashmir responded to the recurrent disasters influenced by opportunities and constraints which affect
38 the capacity of adaptation approaches. Local people had few options other than to adapt to dwindling resources, even though they
39 recognized that their responses were creating new and fuelled existing problems, to which they then also had to adapt. The reported
40 human impact includes death from starvation, disease and migration, abandonment of land, voluntary sale of individuals or their
41 children into slavery, with the most severe consequences of the famines reported amongst the Muslim population. Many orphan girls
42 were sold in the Srinagar city, and even people resorted to cannibalism (Koul, 1925). Despite restrictions, People in Kashmir during
43 nineteenth century had enough anticipation of the seismic hazards they were prone to. This is illustrated by the fact that this
44 adjustment may have been a significant factor influencing the development of indigenous culture and can be found in the design and
45 construction of buildings. During this period every hazard event followed each other in quick succession, thereby increasing the
46 opportunity of temporal overlap among the hazard events. Thus, rule of successive colonial regimes, political and environmental
47 series of events made the situation bad to worse each creating mayhem and subjugation. Following an accumulation of different types
48 of natural disasters, it became more difficult or impossible for Kashmir society to return to previous conditions; thus created ratchet

effect or convergent catastrophes. Moreover, archival transcriptions enable us to confirm number of important drivers of vulnerability derived from the socioeconomic and political factors; thereby no longer understood as purely physical or biological events, but also as sociocultural construct (Quarantelli, 1998). However, with climate a particularly potent force to have been natural trigger for most Kashmir famine crises but not their sole cause. These natural triggers (hazards) operated in the contexts where local economies were weak and political will to intervene was lacking. The colonial rulers of Kashmir thus had no coherent analytical framework for the understanding of peasant poverty, although their case was not seen as pressing by the higher echelons of the ruling class. Their chronic difficulty worsened during the crisis itself, even a single crop failure plunges the people into distress with no resources in reserve to enable to resist famines, or draws them to the verge of pauperism. Thus, the nature of disasters were rooted in co-evolutionary relationship between society and natural system; determined mostly by hazard independent, structural constraints that are social, cultural, economic and political (Watts and Bhole, 1993; Wisner et al., 2004; Gillard and Kelman 2007). Disaster-affected people in Kashmir were marginalized geographically because they lived in hazardous places; socially because they were members of weaker section; economically because they were poor; politically because their voice was disregarded.

Conclusion

Looking back at the historiography of Kashmir, it is no longer possible to decline nineteenth-century as one characterized by general decline, anarchy and chaos. Historical discourse on disasters demonstrates intersecting events and processes (environmental, social, political and economic) transpiring over varying lengths of time during the entire nineteenth-century. These environmental processes were not unusual, but periodic regularities providing differentiated analysis of socioeconomic impact of natural disasters. Moreover, disasters of nineteenth-century Kashmir were inevitable by the historically produced pattern of vulnerability embedded in location, sociopolitical structure, socioeconomic factors and ideology that characterize the behavior of individual and society. Moreover, documentary evidence divulge that historical records of Kashmir has a scope to make use of wealth of archival information, imperative for hazard evaluation, and compare them with the hazards growing due to present global environment change. Nevertheless, historical research on disasters allowed the exploration of mitigation and adaptation processes to changing environmental conditions. As a corollary, occurrence of disasters intervened to transfigure experience and memory into material culture and language respectively, thereby, giving rise to human adaptation and cultural change. As a spinoff, above study illustrates, the very understanding of the natural hazard vulnerability of Kashmir Valley and can help to reduce risk arising out of such processes; much needed to guide regional design, planning and can help to direct future policy responses. These avenues of investigation will be particularly interesting to study emerging vulnerabilities related to ongoing socioeconomic and environmental changes, as these changes are becoming major contributing factors in the emergence of hazard events. How, then, do we gauge the likelihood of these potentially catastrophic events? We firmly believe that looking far ahead is done most advantageously by looking far back.

References

- 1
2 'Administrative Report of the Punjab and its Dependencies for the year 1878-97'. (1879) Punjab Government Civil Secretariat press,
3
4 Lahore.
- 5
6 Adamson, C.D.G. (2014) 'Institutional and community adaptation from the archives: A study of drought in western India, 1790–1860'.
7
8 *Geoforum* (55), 110–119.
- 9
10 Ahmad, B., M.I Bhat and B. S. Bali (2009) 'Historical record of earthquakes in the Kashmir Valley'. *Himalayan Geology* 30 (1). pp.
11
12 75-84.
- 13
14 Ahmad, B., S. Ahmad, A. Alam, S. Wang and M. S. Bhat (2015) 'Looking for Missing Links in Kashmir: An Update on Nineteenth
15
16 Century Seismicity'. *Seismological Research Letters*. 86 (4). Pp. 1219-1224.
- 17
18 Akerkar, S. (2015) 'Development of normative framework for disaster relief: learning from colonial famine histories in India Indian
19
20 Famine Commission'. *Disasters*, (39 S2), S219-S243.
- 21
22 Ansley, Mrs., and J.C. Murray (1879) 'Our visit to Hindustan, Kashmir and Ladakh'. Willium H. Allen, London.
- 23
24 Bhat, M.S. Ahmad, B., A. Alam and A. F. Hakim (2018) 'Flood Hazard assessment of Kashmir Valley using historical hydrology'.
25
26 *Journal of Flood Risk Management*. In Press.
- 27
28 Akhtar, P. (2007) 'The History of Kashmir, in political, economic and socio-cultural perspective'. Kashmir Info Publication Srinagar
29
30 Kashmir.
- 31
32 Akhtar, R. (2008) 'Environment and Cholera in Kashmir during nineteenth-century'. *Indian Journal of History of Science*, 43 (2). pp.
33
34 211-230.
- 35
36 Anyamba, A., J. P. Chretien, J. Small, C. J. Tucker, and K. J. Linthicum (2006) 'Developing global climate anomalies suggest
37
38 potential disease risks for 2006-2007'. *International Journal of Health Geographics*. 5 (60). pp. 1-8.
- 39
40 Blaikie, P., Cannon, T., Davis, I., B., Wisner. (1994) 'At Risk: Natural Hazards, People's Vulnerability, and Disasters'. Routledge,
41
42 London.
- 43
44 Bazaz, P.N. (1941) 'Kashmir in crucibles'. Srinagar, Kashmir.
- 45
46 Bellew, H.W. (1875) 'Kashmir and Kashghar. A narrative of the journey of the embassy to Kashghar in 1873-74'. London, Trübner. p.
47
48 454.
- 49
50 Bamzai, P.N.K. (1962) 'Socio-economic History of Kashmir: 1846-1925'. Metropolitan Book Co., New Delhi. p. 771.
- 51
52 Bankoff, G. (2007) 'Comparing Vulnerabilities: Toward Charting an Historical Trajectory of Disasters'. *Historical Social Research*. 32
53
54 (3). pp.103-114.
- 55
56 Bates, C. E. (1873) 'A Gazetteer of Kashmir'. Reprinted in 1980 by Light & Life Publishers, New Delhi. pp. 110-113.
- 57
58 Bavel, V and Curtis, D. (2016) 'Understanding Disasters Using History' *International Journal of Mass Emergencies and Disasters*, vol.
59
60 34, (1), pp. 143-169.

- 1 Beg, M.A. (1950) 'On the way to golden Harvest'. Agricultural reforms Jammu: Government of Jammu and Kashmir.
- 2 Bernier, F. (1891) 'Travels in Mughal Empire 1656–1668'. trans. by Archibald Constable on the basis of Irving Brock's version, ed. by
- 3 Vincent A. Smith revised by Archibald Constable 2nd Ed., Oxford University Press, London, 1670.
- 4 Bhatia, B.M., (1991) 'Famines in India: A Study in Some Aspects of the Economic History of India with Special Reference to Food
- 5 Problem, 1860–1900'. Konark Publishers PVT Ltd., Delhi.
- 6 Biscoe Tyndale, C. E. (1921) 'Thomas Russell Wade: A Pioneer in Kashmir, Church Missionary Society, London, p. 7.
- 7 Biscoe Tyndale, C. E. (1922) 'Kashmir in Sunlight and Shade'. London
- 8 Brinkman, A. (1867) 'The Wrongs of Kashmir'. Berkley Square, London.
- 9 Bri□a, K. R., P. D. Jones., F. H. Schweingruber and T. J. Osborn (1998) 'Influence of volcanic eruptions on Northern Hemisphere
- 10 summer temperature over the past 600 years'. *Nature*. (393). pp. 450–455.
- 11 Burton, I. (2010) 'Forensic Disaster Investigation in Depth: A new Case Study Model'. *Environment*. 52 (5). pp. 36-41.
- 12 Carter, T.R., Jones, R.N., Lu, X., Bhadwal, S., Conde, C., Mearns, L.O., O'Neill, B.C., Rounsevell, M.D.A., Zurek, M.B., (2007)
- 13 'New assessment methods and the characterization of future conditions'. In: Parry, M.L., Canziani, O.F., Palutikof, J.P., van der
- 14 Climo, W. H. (1893) 'The Floods in Kashmir and Srinagar a New Focus of Endemic Cholera'. *The British Medical Journal*. pp. 396-
- 15 397.
- 16 Coeur, D., Lang, M., (2008) 'Use of documentary sources on past flood events for flood risk management and land planning'. *C.R.*
- 17 *Geosci.* 340, 644–650.
- 18 Collette, J. (1884) 'A Guide for Visitors to Kashmir'. Revised by A. Mitra. (1898) W. Newman & Co., 4-Dalhousie Square. Calcutta.
- 19 pp.68-69.
- 20 Colwell, R. R. (2004) 'Infectious disease and environment: cholera as a paradigm for waterborne disease'. *International Microbiology*.
- 21 7 (4). pp. 285-289.
- 22 D' Souza, R. (2006) 'Drowned and Dammed': Colonial capitalism and Flood Control in Eastern India'. New Delhi.
- 23 Dai, J. C., Ferris, D., Lanciki, A., Savarino, J and M. Baroni (2009) ' Cold decade (AD 1810–1819) caused by Tambora (1815) and
- 24 another (1809) stratospheric volcanic eruption'. *Geophysical Research Letters*. (36). pp. 1-6.
- 25 Davis, M. (2001) 'Late Victorian Holocausts: El Niño Famines and the Making of the Third World'. Verso, London, United Kingdom.
- 26 p. 470.
- 27 Dedamari, K. M. A. (1886) 'Waqati-Kashmir'. (in Persian). Research & Publication Division, Library Srinagar. Folios 296.
- 28 Del Mar, W. (1906) 'The Romantic East-Burma, Assam and Kashmir'. London.
- 29 Devan, A.R. (1877-78) 'Collective Report for the year 1877-78'.
- 30 Digby, W. (1890). 'Condemned Unheard. Indian Political Agency'. 25, Craven Street Charing Cross, London. pp. 176-180.
- 31 Drew, F. (1875). 'The Jummoo and Kashmir Territories: A Geographical Account'. E. Stanford, London. p. 627.

- 1 Elmslie, W.J. (1875) 'Seed time in Kashmir: A Memoir of William Jackson Elmslie'. James Street, London.
- 2 Fagan, B. (2000) 'Floods, Famines and Emporers'. Pimlico, London.
- 3
- 4 Fazey, I., Wise, R. M., Lyon, C., Câmpeanu, C., Moug, P., and T. E. Davies. (2015) 'Past and future adaptation pathways'. *Climate*
- 5 *and Development*, February, pp. 1-19. DOI: 10.1080/17565529.2014.989192.
- 6
- 7 Forester, G. (1808) 'A journey from Bengal to England, through the northern part of India, Kashmir Afghanistan and Persia and into
- 8 Russia by the Caspian Sea'. Faulder & Sons, New Bond Street, London.
- 9
- 10
- 11 Franks, D. (1989) 'Hazard Mitigation'. In J. Blum and C. Phillips (eds) *International Hazards*. Collins, London. pp. 315-342.
- 12
- 13 Galancy Commission Report. (1933) 'Appointed under the orders of his Highness Maharaja Bhadur dated 12th November 1931'.
- 14
- 15 Ganeshi, L M (1846) 'Siyahat-i-Kashmir'. (Persian). English Translation. Vidya Sagar Suri, Simla 1955.
- 16
- 17 Gillard, J.C and I. Kelman (2007) 'Disaster Research and Policy, History'. In P. T. Bobrowsky (edt) *Encyclopedia of Natural Hazards*.
- 18 Springer Dordrecht, Heidelberg, New York, London. pp.160-164.
- 19
- 20
- 21 Gergis, J. L and A. M. Fowler (2006) 'How unusual was late 20th century El Niño-Southern Oscillation (ENSO)? Assessing evidence
- 22 from tree-ring, coral, ice-core and documentary palaeoarchives, A.D. 1525–2002'. *Advances in Geosciences*, 6, 173–179.
- 23
- 24
- 25 Gergis, J. L and A. M. Fowler (2009) 'history of ENSO events since A.D. 1525: implications for future climate change'. *Climatic*
- 26 *Change*. 92 (3), pp. 343–387.
- 27
- 28
- 29 Gracia-Acosta, V. (2002) 'Historical Disaster research'. In: S. M. Hoffman and Oliver-Smith (eds) *Catastrophe & Culture: The*
- 30 *Anthropology of Disaster*. School of American Research Press, Santa Fe, New Mexico, pp 49-66.
- 31
- 32 Grayson, D. K. and P. D. Sheets (1979) 'Volcanic disasters and the archaeological record'. In: P. D. Sheets and D. K. Grayson (eds)
- 33 *Volcanic Activity and Human Ecology*. Academic Press, London. pp 623–632.
- 34
- 35
- 36 Harte (1993) 'The Green Fuse: An Ecological Odyssey'. University of California Press, Berkeley, CA. p. 156.
- 37
- 38 Hassan, M. (1959) 'Kashmir under the Sultans'. Ali Mohammad & Sons, Srinagar Kashmir.
- 39
- 40 'Henvey's Report on Kashmir'. (1883) Confidential (Simla Records) Foreign Department, Secret E, Proceedings No. s, 239-240.
- 41
- 42 Hervey, Mrs. (1853) 'The Adventure of a Lady in Tartary, Tibet, China and Kashmir'. 3 vols. Hope & Co. London.
- 43
- 44 Hodson, G.H. (1886) 'Hadson of Hadson's Horses'. 2 Vol., London Kegan Paul, Trench and Co.
- 45
- 46 Hugel, B. C. (1836) 'Notice of a Visit to the Himmaleh Mountains and the Valley of Kashmir, in 1835'. *Journal of Royal Geographical*
- 47 *Society*. (6). pp.343-350.
- 48
- 49
- 50 Hugel, K. A. (1845) 'Travels in Kashmir and the Punjab'. John Petheram, 71, Chancery Lane, London. p. 464.
- 51
- 52 Ince, J. (1888) 'Ince's Kashmir Handbook: a Guide for Visitors. Re-written and much enlarged. By Joshua Duke'. Calcutta Thacker,
- 53 Spink and Co. p. 337.
- 54
- 55
- 56 Integrated Research on Disaster Risk. 'IRDR'. (2015) 'the FORIN Project: Understanding the Causes of Disasters'. Beijing:
- 57 Integrated Research on Disaster Risk.pp.2-3.
- 58
- 59
- 60

- 1 Izzatullah, M. (1882) 'Travels in Central Asia in the Year 1812-13'. Translated by: P. D. Henderson, Calcutta: Foreign Department,
2 1882.
3
- 4 Jahn, T. and P. Wehling (1998) 'Gesellschaftliche Naturverhältnisse-Konturen eines theoretischen Konzepts'. In: K. W. Brand (ed)
5 Soziologie and Natur: Theoretische Perspektiven. Soziologie and Ökologie. (2). PP. 75-93.
6
- 7 Jalali, J.L. (1931) 'Economics of Food Grains in Kashmir'. Lahore.
8
- 9 Jammu and Kashmir Political no. JK . Pol. (1889) No. 39.
10
- 11 Jones, E. J. (1885) 'Notes on the Kashmir earthquake of 30th May 1885'. Records Geological Survey of India. (18). pp. 153-156.
12
- 13 Kachru, P. B. (1836) 'Majmu'-ut-Tawarikh'. (Persian manuscript). Research & Publication Division, Library Srinagar.
14
- 15 Kalhana Pandit (1148-49) 'Rajtarangani'. (Sanskrit).
16
- 17 Kaw, M.A. (1996) 'Famines in Kashmir, 1586-1819: The policy of the Mughal and afghan rulers'. The Indian Economic and Social
18 History Review. 33 (1). pp. 59-68.
19
- 20 Kaw, M.A. (2001) 'The Agrarian System of Kashmir, 1586-1819 AD'. Aiman Publications, Srinagar.
21
- 22 Khanyari, G.N. (1857) 'Wajiz-ut-Twarikh'. (Persian). Research & Publication Division, Library Srinagar.
23
- 24 Khasta, P. H. G. (1888) 'Guldast-i-Kashmir'. Kitab Ghar, Billimaran, Delhi. pp. 266-278.
25
- 26 Khoihami, P. G. H. (1885) 'Tarikh-i-Hassan'. (Persian manuscript). Vol. I & II Folios 511 & 263.
27
- 28 Knight E.F. (1893) 'Where Three Empires Meet, a narrative of recent travels in Kashmir, Western Tibet, Gilgat and the adjoining
29 countries'. London.
30
- 31 Knowles, J. H. (1885) 'A Dictionary of Kashmiri Proverbs & Sayings: Explained and Illustrated from the rich and interesting
32 Folklore of the Valley'. Education Society's Press. Calcutta. pp. 60-61.
33
- 34 Korbel, J. (1954) 'Danger in Kashmir'. London.
35
- 36 Koul, P. A. (1925) 'Geography of Jammu & Kashmir State'. Thacker Spink, Calcutta, India. pp. 98-112.
37
- 38 Lawrence, W. (1895) 'Valley of Kashmir'. London, Henry Frowde Oxford University Press, Warehouse Amen Corner. p. 530.
39
- 40 Leroy, S. A. G. (2011) 'Historical Events'. In: P. T. Bobrowsky (ed) Encyclopedia of natural Hazards. Springer Verlag UK.. pp. 452-
41 470.
42
- 43 Linden, P.J., Hanson, C.E. (Eds.), 'Climate Change 2007': Impacts, Adaptation and Vulnerability. Contribution of Working Group II
44 to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, pp.
45 133-171.
46
- 47 Logan, R. (1891) 'Report on the financial conditions of Kashmir'. New Delhi.
48
- 49 Loveday, (1913) 'The History and Economics of Indian Famines'. Usha Publications, Ansari Road, Daryaganj, New Delhi.
50
51
52
53
54
55
56
57
58
59
60

- Macnamara, F.N. (1880) 'Climate and medical topography in their relation to the disease distribution of the Himalayan and sub-Himalayan districts of British India: with reasons for assigning a malarious origin to goiter and some other disease'. London Longman Green & Co.
- Martinez-Urtaza, J., J. Trinanés, N. Gonzalez-Escalona, and C. Baker-Austin (2016) 'Nature Microbiology'. (1). March. pp. 1-3.
- McMichael, A. J., R. E. Woodruff and S. Hales (2006) 'Climate change and human health: present and future risks'. *Lancet* 367 (9513). pp. 859-869.
- Merjanpuri, M. K. (1871) 'Tarikh-i-Kashmir'. Research and Publication Division, Srinagar. Vols. 1 and 2, Folios 195 & 158 (in Persian).
- Miskeen, Mohi-ud-din. (1899) 'Tarikh-i-Kabir Kashmir'. Vol. I & II (Persian), Folios: 370 & 28.
- Mitra, A. (1889) 'Medical and Surgical Practices in Kashmir'. Lahore, pp.9.
- Moorcroft, W and G. Trebeck (1841) 'Travels in the Himalayan Provinces of Hindustan and the Punjab; in Ladakh and Kashmir, in Peshawar, Kabul, Kunduz, and Bokhara from 1819-1825'. J. Murray, London. pp. 279-281.
- Neve, A. (1885) 'The late earthquake in Kashmir'. *The Lancet*. pp. 4555. Sept.
- Neve, A. (1913) 'Thirty Years in Kashmir'. Edward Arnold, London, p. 316.
- Neve, A. (1913) 'Tourist Guide to Kashmir, Ladakh, Khardo'. Civil and Military Gazette Press, Lahore.
- Neve, E. F. (1900) 'A Brief Account of the recent Epidemic of Cholera in Kashmir'. *British Medical Journal*. pp. 1705-1706.
- Neve, E. F. (1921) 'Beyond the Pir Panjal: life among the mountains and valleys of Kashmir'. London.
- Norris, D. (1932) 'Kashmir: The Switzerland of India'. John Collet.
- Oliver-Smith, A. (1999) 'What is a disaster?' Anthropological perspectives on a persistent question. In: Oliver-Smith A, Hoffman SM (eds) *The angry earth. Disaster in anthropological perspective*. Routledge, London, pp. 18-34.
- Oliver-Smith, A and S. M. Hoffman (2002) 'Why Anthropologists Should Study Disasters'. In: S. M. Hoffman, Oliver-Smith (eds) *Catastrophe & Culture: The Anthropology of Disaster*. School of American Research Press, Santa Fe, New Mexico, pp. 3-22.
- Osborne, W.G. (1840) 'The Court and Camp of Ranjeet Singh' Oxford University Press, London.
- Palerm, A. (1980) 'Anthropologia Marxismo'. Maxico, D. F: Centro de Investigaciones superiores del instituto Nacionale de Antropologia e Historia/Editorial Nueva Imagen. p.347.
- Paremu, R. K. (1977) 'A History of Sikh Rule in Kashmir'. Government Press, Srinagar, India. pp. 47-49.
- Purdon, W. H. (1861) 'On the trigonometrical and physical configuration of the Valley of Kashmir'. *Journal of Royal Geographical Society*. (31). pp.
- Peoples and Bailey (1997) 'Humanity: An Introduction to Cultural Anthropology'. Belmont, CA: Wadsworth. p. 496.
- Qamar-ud-Din Mirza (1860) 'Roznamcha (Daries)'. Research & Publication Division, Srinagar.

- 1 Quarantelli (1998). 'What is Disaster? The Need for Clarification in Definition and Conceptualization in Research', In S. Solomon
2 (ed.) *Disaster and Mental Health: Selected Contemporary Perspectives*, Washington DC: U.S. Government Printing Office. pp. 41-
3 73.
- 4
5 Rai, M. (2004) 'Hindu Rulers, Muslim Subjects: Islam, Rights, and the History of Kashmir'. Princeton University Press. p. 335.
- 6
7 Ram, P. B. (1895) 'Report on the Administration of the Jammu and Kashmir State for 1892-93'. Rambir Prakash Press, Jammu. pp.
8 132-33.
- 9
10 Ram, K. (1870) 'Gulzar-i-Kashmir'. Koh-i-Noor Press'. Lahore, Pakistan, pp. 516.
- 11
12 Richard .H. Grove (2007) .'The Great El Niño of 1789–93 and its Global Consequences'. *The Medieval History Journal*. 10 (1-2).
13 pp.75-98.
- 14
15 Riede, F. (2014) 'Towards a science of past disasters'. *Natural Hazards*. (71). pp. 335–362.
- 16
17 Riede, F. (2015) 'Past Vulnerability: Volcanic eruptions and human vulnerability in traditional societies past and present'. AARHUS
18 University Press, Langelandsgade 177 DK-8200 Aarhus N.
- 19
20 Riede, F. (2017) 'Past-Forwarding Ancient Calamities. Pathways for Making Archaeology Relevant in Disaster Risk Reduction
21 Research'. *Humanities* (6), 79, pp. 1-25. doi:10.3390/h6040079.
- 22
23 Roy, T. (2012) 'Natural Disasters and Indian history'. Oxford University Press, India.
- 24
25 Saif-ud-Din, M. (1846-1858) 'Roznamcha'. (Daries) 13 Vols. Research & Publication Division, Srinagar.
- 26
27 Saraf, M.Y. (1931) 'Kashmiris fight for freedom, 1819-1846'. Lahore Pakistan.
- 28
29 Schenk, G. J. (2014) 'Common Grounds in Early Modern Disaster Experiences? Some Remarks on New Trends in Historical
30 Disaster Research as part of Environmental History and Climate History'. In M. Knoll and R. Reith (eds) *An Environmental History
31 of the Early Modern Period: Experience and Perspective*. LIT VERLAG Gmbh & Co. KG Wien, Zurich. pp. 11-18.
- 32
33 Schonberg, B. E. V. (1853) 'Travels in India and Kashmir'. Huest and Blackett, Publishers, 13, Great Marlborough Street. Vol. I. P.
34 370.
- 35
36 Shoemaker, M. M. (1912) 'Indian Pages and Pictures Rajputana, Sikkim, the Punjab, and Kashmir. G. P. Putman'S Sons, New York
37 and London, Knickerbocker press. pp. 283-425.
- 38
39 Singh, B.S. (1988) 'The Jammu Fox, a Biography of Maharaja Ghulab Singh of Kashmir, 1792-1857'. Heritage Publishers, New Delhi
40 India.
- 41
42 'State Council resolution'. (1923) '(No: XV, August 22, 1922)' F/68/Misc-73/1923.
- 43
44 Stein, M. A. (1899) 'The Ancient Geography of Kashmir'. Research and Publication Department, J&K Govt. Srinagar.
- 45
46 Sufi, G.M.D. (1948). 'Kashir'. Lahore University of Punjab. Vol. II. Capital Publishing House, New Delhi.
- 47
48 Suri, S. (1849) 'Umdat-ut-Tawarikh'. Research & Publication Division Library, Srinagar.
- 49
50 Temple, R. (1887) 'Journals kept in Hyderabad, Kashmir, Sikkim, and Nepal'. London, W. H. Allen & co.
- 51
52
53
54
55
56
57
58
59
60

1 Thorp, R. (1870) 'Cashmere Misgovernment'. Longmans'. Green, and Company, London.

2 Torrens, H.D. (1863) 'Travels in Ladakh, Tartary and Kashmir'. London.

3
4 Vigne, G. T. (1842) 'Travel in Kashmir, Ladakh, Iskardo, the countries adjoining the mountain course of the Indus, and the
5 Himalaya, north of the Punjab. London. (2). p. 480.

6
7 Vivek. (1890) Gazetteer of Kashmir & Ladakh. Delhi.

8
9
10 Watts, M. J., and H. G. Bhole (1993). 'The Space of Vulnerability: the causal structure of hunger and famine'. Progress in Human
11 Geography, 17 (1).pp. 69-76.

12
13 Wakefield, W. (1879) 'The Happy Valley: Sketches of Kashmir and the Kashmiris'. S. Low, Marston, Searle, & Rivington, London,
14 United Kingdom. p. 356.

15
16
17 Wilson, A. C. (1900) 'A Woman's Life Kashmir Irene Petrie; A Biography'.

18
19 Wingate, A. (1888) 'Preliminary Report of Settlement Operations in Kashmir and Jammu'. W. Ball and Co., Lahore, Pakistan. pp. 1-
20 47.

21
22
23 Wisner, B., P.P. Blaikie., T. Cannon., and I. Davis (2004) 'At Risk: Natural Hazards, People's Vulnerability and Disasters'. 2nd ed.
24 London, Routledge. pp. 45-46.

25
26
27 Youngusband, F. (1890) 'Noorthern Frontier of Kashmir' Oriental Publishers Delhi.