Spatio-Temporal and Physiographical Study of the Abandoned Sutlej River: A Case of Jhangi Wala, Bahawalpur, Pakistan

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Abstract: Rivers are the sign of prosperity, the hub of the economy and act as lifeline for the areas from where they flow. Rivers help in irrigation, ground water recharge, upgrading water quality, maintaining soil fertility, fostering forests. They also support in stabilizing industries, establishing cities and towns. Revirs are the sources of energy generation, enhancing tourism, managing wetlands, boosting fishing, avoiding desertification, droughts, famine and empowering people by providing employment opportunities. Rivers might stop flowing in any area through climatic changes, river piracy, and upper riparian monopoly. Sutlej River is now not flowing in Pakistan due to damming at its upper riparian (India) after the Indus Basin Water Treaty. In this paper, efforts are made to know about evolutionary processes through which Sutlej River passed from the old days and its present cruel and politicized abundance by the upper riparian. The main objective of the paper is to furnish a preliminary data base about Pakistan side (lower riparian) of the Sutlej River. Fact and figures used are mainly from the secondary sources and few primary sources and direct observations. By exploring and knowing about its spatial pattern, temporal evolutions, geographical, geological and physiographical changes and all the processes concerned to the river, it will be possible for us to educate our future generation about the conversion of past mighty and splendid Sutlej River into an abandoned River.

Keywords: Sutlej River, Geospatial, Temporal, Physiographical study, Jhangi Wala, Bahawalpur.

INTRODUCTION

Rivers are the sign of prosperity and act as lifeline for the areas from where they flow. Rivers are the hub of economy, opportunities, source and hope of life. Rivers help in irrigation, ground water recharge, upgrading water quality, maintaining soil fertility, fostering forests, stabilizing industries, establishing cities and towns, arranging and stabilizing ecosystem, enhancing biodiversity, boosting fishing, tourism, producing energy, managing wetlands, lessen environmental problems, avoiding desertification, droughts, famine and empowering people by providing employment opportunities. The Sutlej River was one of the mighty and ancient rivers of the Indo-Pak sub-continent. Due to Indus Basin Water Treaty, the river was exclusively possessed by India in 1960. Since that time the water of the Sutlej River is being utilized by India through canalization and damming over the Sutlej River. Therefore, water in lower part of the Sutlej River in Pakistan gradually decreased over the years until it approached the zero level in 2001 [1]. This is why the word 'abandoned' is used which means, 'no longer used' [2]. The Sutlej River, one of the most ancient and longest rivers in Indo-Pak Sub-continent Known 'Zaradros' or 'Hesidros' to the ancient Greek, 'Sydrus' in Romans, 'Shatadru', 'Shutudri' or 'Shutudru' in Sanskrit, 'Sutudir' or 'Sutudri' in Vadas meaning "swift flowing" river, 'Lanchuhe' in Chinese [3] 'Langqên Zangbo' (meaning 'elephant river') in Tibet [4], 'Sutluda' in Himalayan (hilly) area [5] and Ghara in Seraiki Community in Pakistan [6]. The Sutlej River, pronounced as 'Satluj' in Pakistan and India [7]. It is 1,440 km or 900 miles long [8] wherein 329 miles exist in Pakistan with a catchment area of 41,208 square miles [9]. It originated from the south west of Tibet (China) in the Himalayan Range. It is sometimes called as 'Red River' [10]. The height of its origin was 15,200 ft. or 5,067 meters above sea level with 395,000 sq. km. of its basin area. The river flowed through three countries, India, China and Pakistan. The Beas River is the main tributary of the Sutlej River that joined the Sutlej at Harike in India. Approximately 120 km of its

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course serve as the border between India and Pakistan [3]. Sutlej River was one of the eastern tributaries of the Indus River along with three north-eastern rivers viz; the Jhelum, the Chenab and the Ravi, that join the Panjnad Headworks between Uch Sharif and Alipur. All these rivers flow jointly under the name of the Panjnad River for 72 km and then join the Indus River at Kot Mithan (or Mithan Kot). The length of a section of Sutlej River from Head Islam to Head Panjnad is 176 km [11]. This section of the Sutlej River remains dry and most crumbled due to unavailability of diverted water except flood days. Therefore, people have developed houses in the bed of the river [12]. Farming is practiced and sand pits or mines are also found in river beds. The main tributaries of the Sutlej River are the Chenab and the Beas[1] Rivers. The Spiti is another tributary of the Sutlej River lies north of Great Himalaya [13]. The major towns along the Sutlej River are Ganda Singh Wala, Kasur, Pakpattan, Minchinabad, Bahawalnagar, Chishtian, Hasilpur, Qaimpur, Bahawalpur, Ahmedpur East and Uch Sharif in Pakistan, Nangal and Phillaur in India [10]. The Sutlej River exhibits spectacular sloping course, exactly through the lesser and greater Himalayas [13]. Water is taken from Head Balloki to the Sutlej River at Head Sulemanki. Mailsi Link is outcropped from the Ravi River at Head Sidhnai near Abdul Hakim (Multan) that passes under the Sutlej River in order to irrigate Bahawalpur District [12]. These link canals provide a small amount of water upto Head Islam. Beyond Head Islam to Head Panjnad is the most affected and crumbled area which needs serious attention and alternative compensating sources. This 176 km long section constitutes 53.5% of the portion of the river bed in Pakistan. The objectives of the paper are: (a) to make people aware about the lifeline of Bahawalpur and to provide and deliver baseline data for advanced research. (b) And to know about the Geospatial, temporal and Physiographical processes by which the Sutlej River undertook.

MATERIAL AND METHODS

Study Area

Jhangi Wala is a riverine rural area and is sometimes called as "Jhangi Wali". The absolute Location of Jhangi Wala is 29° 25′ N, 71° 45′ E. It is only 09 km northeast of Bahawalpur City. Jhangi whale is at an average height of 396 ft above sea level, having 22,194 acres of land with cultivable land of 14,300 acres. A canal irrigating land of Jhangi Wala is Bahawalpur distributary. River runs for about 15 km from Mangwani to Empress Bridge forming meanders and braided channels. The area was inundated several times by the Sutlej Flooding. In 1871, a *band* or embankment named as 'Empress Flood *Bund*' was built close to Lashkar de Goth upto Empress Bridge, with a cost of PKR 10,000. Jhangi Wala has a diverse topography. Alluvial plains form the main share of the study area and provides fertile land which is largely used for agriculture. Alluvial terraces in the area show Badland topography due to sand mining and lack of water. People leveled the area and using the land for agriculture. The soil of this area is very fertile and best suited for agricultural activities [14].

Data Collection and Analysis

The relevant data is collected from different sources and is arranged in tabular form. The data is collected from toposheets, research articles, books, Governmental and Non- Governmental archives and frequent visits of the Sutlej River for fresh data collection and capturing.

Objective

The main objective of the paper is to furnish a preliminary data base about Pakistan side (lower riparian) of the Sutlej River.

RESULTS AND DISCUSSION

Sutlej River- Geospatial, Temporal and Physiographical Processes

Sutlej River was one of the mighty and ancient rivers of the Indo-Pak sub-continent. Due to Indus Basin Water Treaty, the river was exclusively possessed by India in 1960. Since then, the water of the Sutlej River is being utilized by India through canalization and damming over the Sutlej River. Therefore, water in the lower part of the Sutlej River in Pakistan gradually decreased over the years until it approached the zero level in 2001 [1].

Sutlej River rises between the sources of the Brahmaputra (in the east) and the Indus River (in the west). It originated from the north slope of the Himalayas and southern slopes of the Kailas Range[2]

[1]The largest tributary of Sutlej River (460 km long), remained conflicted between Pakistan and India for long time. Now, India has exclusive control over the Beas River through Beas Project. This project consists of Beas-Sutlej Link Canal, Beas Dam at Pong and Beas Transmission System and was completed by joint venture of Punjab, Haryana and Rajasthan States of India.

[2]Originating mountain range of the Sutlej, the Indus and the Brahmaputra River close to the Mansorawar lakes.

Table 1: Geospatial, Temporal and Physiographical Processes of Sutlej River

Sr. No.	TIME FRAME	REMARKABLE PROCEEDINGS
1	2000 BC	Sutlej and Sarasvati Rivers were the tributaries of Jumna.
2	2000-1500 BC	Jumna River joined Ganges River and left Sutlej River
3	500BC-1100 AD	Sutlej joined Beas River and Left Jumna River System
4	150 AD	Sutlej and Hakra were the same rivers, according to Ptolemy's map
5	1245	Sutlej River turned north
6	1255	Hakra dried due to the turning of Sutlej River towards north
7	1296	Damaging Lal Sohanra Shrine due to change in its course (Iqbal *et al*., 2015).
9	1701-172	Settling of Daudpotras along Sutlej River
10	1744	Damaging Basti Khairpur Tamewali[a] due to erosion through flooding (Iqbal *et al*., 2015).
11	1758	Sutlej River flooding damaged early settlement of Ahmedpur East (recently, a tehsil of Bahawalpur) [Ibid].
12	1796	Sutlej left Ghaghara and joined the Beas River
13	1866	Suggestion to construct a weir on Sutlej
14	1871	Flood inundate 1300 sq. miles of lowlands
15	1899	Planning of Lower Bari Doab (Iqbal *et al*., 2015).
16	1930	The Sutlej Valley Project started
17	1942	Flood (Iqbal *et al*., 2015).
18	1943	Flood (Ibid).
19	1945	Sutlej flood affected fringing areas of Bahawalpur i.e., Jhangi Wala, Lashkar de Goth and other peripheries
20	1955	High flooding (Ibid).
21	1960	Indus Basin Water Treaty (IBWT) including the water of Sutlej River.
22	1973	River flooding (Ibid).
23	1980	River flooding (Ibid).
24	1988	Very high flooding, India released Seven Lac Cusecs of water, damaging Bahawalpur City and fringes (Iqbal *et al*., 2015). Flood also damaged 83.33 hectares (200 acres) of *the Rakh Jamlera Forest* at Jamlera near Vehari, Punjab (Shad, 2009).
25	1995	River flooding (Iqbal *et al*., 2015).
26	2003	Exclusively dry bed of the Sutlej River. Extended drought was experienced upto a decade.
27	2008	Construction of Baba Fareed Bridge
28	2010	High flooding affected 538 km² areas of Bahawalpur extending up to 2 months (Iqbal *et al*., 2015).
29	2011	Inauguration of Moosa Pak Bridge; One Lac cusec of flood water affected low lying areas of Bahawalpur
30	2013	Severe flood damaged 13 out of 28 houses of Basti Yusuf Wala near Jhangi Wala and destroy Ahmedpur East.
31	2014	Flood demolished five more houses of Basti Yusuf Wala.
32	2015	High flood eroded its embankments, engulfing nearby agricultural land in Jhangi Wala, Bahawalpur
33	2016	Extremely lean flow in January 2016 due to extreme wet years in India and Pakistan.
34	2017	Intermittently low flow and dry bed of the river in first quarter of the year 2017.

Source: [14, 18].
[a]Now a tehsil of Bahawalpur on Hasilpur road.

[15] from Rakshastal Lake [16, 4] in Tibet, at a height of about 6,000 meters above sea level. In its upper reaches the river flows from south east to northeast and pursues its course along the broad valley dividing the Himalayas from Tibet. In the upper reaches it passes through Lake Mansorawar and Lake La'nga. The river then turns in the general direction of flow from the northeast to southwest. Flowing northwestward and then west-south westward through Himalayan gorges, it enters and crosses the Indian state of Himachal Pradesh before beginning its flow through the Punjab plain near Nangal[3], Punjab State. After forcing its way across Himalayan ridges and foothills in a narrow valley with innumerable rapids, the river emerges into the Punjab Plain near the town of Rupar [3]. At Nari Khorsam[4], the Sutlej River cut amazing canyon

[3]One of the city over the Sutlej River in Indian Punjab, north western India. It has a natural lake and a dam over Sutlej River. It is a city at the border of Himachel Pradesh and Indian Punjab, north of Simla
[4]A province of Tibet with a height of 15000 ft having rocky valley filled with recent alluvium.

comparable with Grand Colorado Canyon [5]. It was thought that the Sutlej was the youngest among the great Himalayan Rivers [17, 13]. Egypt is the gift of the Nile and Sindh is the gift of the Indus. Similarly, Bahawalpur is the gift of the Sutlej.

In the ancient days, changes occurred with the time being in the southern route of the Sutlej River. During Aryan times, the Sutlej River had a direct outlet in the Runn of Kutch via Hakra in Cholistan and Nara in Sindh [19]. Greek Philosopher Ptolemy's map of 150 AD and his writings explained that Sutlej and Hakra were the same rivers, whose one branch turned to the west forming Sutlej [20]. Prior to 2000 BC., the Jumna River System had Sutlej along with Sarasvati as its two tributaries that joined it at the present day Bhawar. Towards southwest, it made an inland delta near Derawar Fort, leading drainage beyond to empty into the Arabian Sea at the Kori Creek in the Runn of Kutch [21]. Before 2000 BC, the collective waters of the Sutlej, Sarasvati and Chautang (Ur Jumna) streamed westwards in the direction of present day Hakra Bed [22]. With the change of Jumna River pathway, Sarasvati was dried up and Sutlej had changed its course. The Indo- Gangetic divide does fall within an active seismic zone. The tectonic turbulences might have been liable for abrupt and repeated changes in the river courses and their tributaries [23]. Due to this seismic activity during 2000 to 1500 B.C., Sutlej River remained alone and flowed at its old path after shifting of Jumna River eastward that joined Ganges River. During 500 B.C. to 1100 A.D., Sutlej joined Beas River that was tributary of Chenab River previously. About 1300 to 1500 A.D., Sutlej River left Beas River and turned back to its previous path joining Indus River. After seismic activity the area previously owned three rivers had only one River, the Sutlej River [21]. In 1245, Sutlej River turned to the north, leaving dried up Hakra. It caused toll migration from the Desert [19]. Shakir Shujaabadi, a legendary Seraiki Poet depicts this situation (of the loss of two rivers, one is lost Hakra River and another is abandoned Sutlej River) in his poetry in following words:

Ajan hin vainr jhokan te

Jo he he Hakra kin ge

Rutha Satluj vee Rohi tuun

Badal koon sochna pe ge

(Translation: People of the Rohi still mourn on the loss of "The Hakra River" and quest for, where it has lost. Sutlej River also changed its course from Rohi that kept the clouds to think that they should pour or not).

In 1296, at Lal Sohanra National Park, Sutlej River changed its course and damaged shrine of Lal Sohanra [21]. By 1593, the Sutlej after leaving Ghaghara turned to further north. Then Beas joined it from southern side and flowed further jointly under the separate names- Machhu Wah, Hirani, Dand, Nurni, Nili and Ghara in various areas**.** Again the Sutlej River turned to its previous course and rejoined the Ghaghara. In 1796, Sutlej once again left the Ghaghara and joined the Beas River [19]. Oldham (1874) claimed that Sutlej did not flow here in the ancient days. It flowed to the south-eastern in the north- eastern portion (where Boorey Wala, Mailsi, and Kehror Pacca are situated today) of Bahawalpur State instead of turning towards south-west. Oldham (1887) agreed that it was Sutlej River that became Hakra in the Cholistan region and Nara in the northern Sindh and ultimately ended into the sea at Runn of Kutch.

According to a topo- sheet no. 39/0/11 produced by the Survey of India during years 1933- 34 under the direction of C.A.K. Wilson that was reprinted in 1951 by Survey of Pakistan shown an oxbow lake at Lashkar de Goth[5] and flowing river close to Basti Sahlan. In those days, Gud pur was at the northern side of the Sutlej River. But now, Basti Gud pur is at the southern bank of the Sutlej River. During the time span of 80 years Sutlej River changed its direction almost 11 km northward. Stein [24] witnessed that dry branches of ancient rivers near to the Derawar Fort, Walhar and Kud Wala are evidences of passage of Sutlej River in older days [20]. According to District Census Report of Bahawalpur, 1972 Sutlej River flowed at a distance of 4.8 km towards north of Bahawalpur [25]. From 1701 to 1727, Daudpotras were settled along Sutlej River [26-27]. They cleared forests on both sides of the Sutlej River, outcropped canals through it for agricultural practices. During the time of the British Government in India, it was suggested to construct a weir on Sutlej in 1866 to irrigate areas other than Bahawalpur State. For this in 1869, surveys were conducted and it was proposed to allocate a certain amount of water to Bahawalpur [23].

The inundation canals fed by the Sutlej River were converted to perennial canals from 1915 to 1930 [28]. In 1930, Sutlej Valley Project was started by the then

[5]Goth is a Seraiki and Sindhi word meaning 'village'.

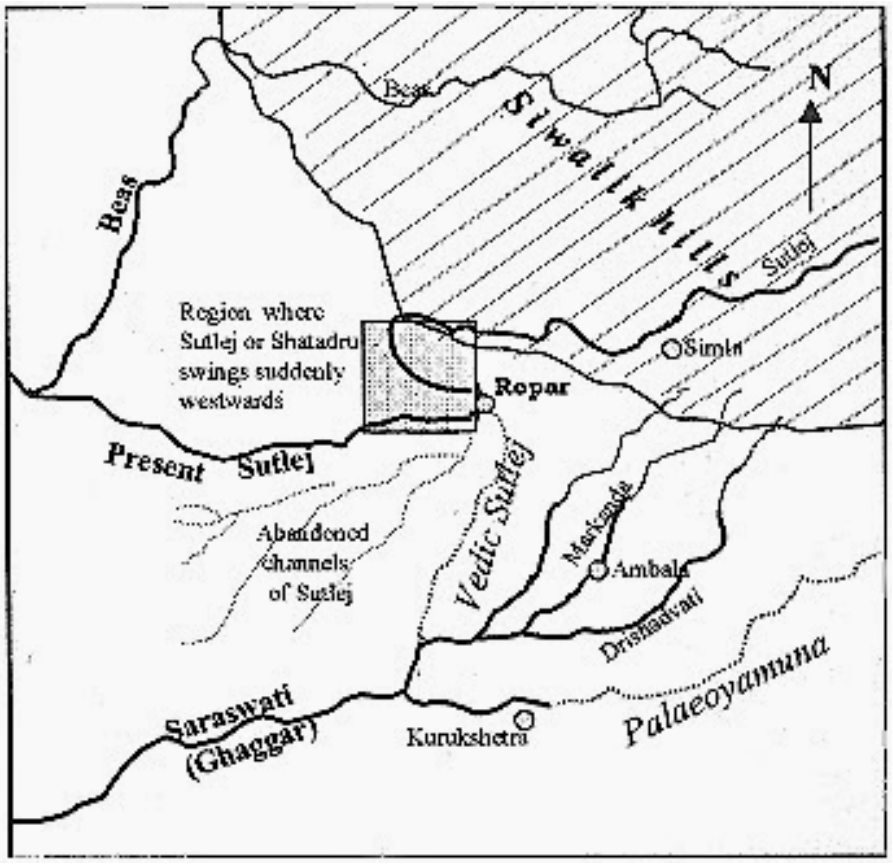

Figure 1: Map showing Sutlej River's abandoned channels and present course.
Source: [14].

Nawabs of Bahawalpur State under the kind supervision of Colonel Minchin (A British Army Officer). Under this project four head works and twelve link canals were constructed. Just after its closure in 1960 due to the Indus Water Treaty (a treaty for the division of the great irrigation system of the Sub- Continent) the provision of water to Sutlej River was made possible with two link canals viz; Balloki (Ravi) to Sulemanki (Sutlej) that carried 6500 cusec and Sidhnai (Ravi) to Mailsi that carried 10,000 Cusec water to Islam Head works. Pakistan and India had generally implemented the Indus Water Treaty, which was contracted on 19 September 1960 in Karachi. India received direction to use the waters of three eastern rivers; the Ravi, the Beas, and the Sutlej 80 percent of the water resources of the Indus River catchment area. Pakistan was to utilize the resources of the three western rivers; the Indus, the Jhelum, and the Chenab. To compensate Pakistan's loss of the eastern tributaries of the Indus, the construction of a complex of hydropower plant and irrigation project at the cost of 10 billion rupees, and the setting up of the Indus Basin Development Fund were envisaged in the treaty. The project was financed and built by a consortium of several countries in the supervision of the International Bank for Reconstruction and Development. In April 1964, the Consortium and Pakistan concluded an additional agreement worth $315 million to finance the Tarbela Dam on the Indus. The bulk of the work envisaged by the 1960 agreement was concluded in 1965-67, including the construction of seven connecting canals (which were to move 17 thousand million cubic meters of water from the western rivers of the basin to the eastern rivers), five dams, and the Mangla water reservoir and hydro-electric plant on the Jhelum. The last project, the Indus-Jhelum canal, was completed in 1973. The Sutlej River has a number of bridges over them. In the hilly areas, it has bridged at Wangtu, Rampur, Lohri, Seoni, Moosa Pak Shaheed Bridge [29] and Baba Fareed Bridge. Among the railway bridges that was laid down by the North- Western Railway is at Phillaur (India), Kasur (Upper Punjab) and Adam Wahan in Bahawalpur [19]. At the time of Bahawalpur as a state, the river had fish and crocodiles in it. A preserved crocodile was once kept in Bahawalpur Museum but has vanished [12]. Another crocodile is still preserved in a zoological museum of the Government Sadiq Egerton College, Bahawalpur.

CONCLUSION

Sutlej River, once one of the mighty rivers, now an abandoned river. Sutlej River has a rich past. It remained a part of various rivers in different time and space. It has undergone various evolutionary and physiographical processes. Sutlej River was once a part of Jumna River. Afterward Sarasvati or Ghaghra River joined it and ended into the Arabian Sea. Gradually, it left Sarasvati River and joined Beas and emptied into Punjnad after forming meandering and braided channels in Bahawalpur. Sutlej River is neglected area in Pakistan. The river flooded many times furiously with notable floods of 1955, 1988, 2010, 2013 and 2015 with intermittently drought due to its closure. Before partition, much of the work was done to develop and use the water of Sutlej River in Bahawalpur including the Sutlej Valley Project. Many canals were taken from the river to irrigate vast areas of Bahawalpur. In 1948, Indian aggressive and narrow thinking stopped the waters of the Sutlej River, demolished all the developed infrastructure, regional ecology, biodiversity, and agricultural setup of Bahawalpur region. Due to the closure of thousands of years old Sutlej River, the water level of adjacent areas dropped, water quality degraded, riverine flora and fauna vanished, people livelihood associated with the river was perished, people migrated, and the culturally splendid past of Sutlej Valley Civilization is going to die. And the World is waiting for the ultimate death of Sutlej Valley civilization to commemorate the splendid past. But it will not more than, "Whatever has been done cannot be undone".

REFERENCES

[1] PWG. Water shortage in Pakistan: Special Section 2. Published article derived from Pakistan Water Gateway (PWG), Pakistan, 2003.

[2] Hornby AS. Oxford Advanced Learner's Dictionary of Current English. (7th ed.). Oxford University Press, New York 2005; p. 1.

[3] Malik H, Gankovsky YV. The Encyclopedia of Pakistan. Oxford University Press, New York 2006.

[4] Khalid R. Landforms of Sutlej River in Bahawalnagar. An unpublished research report for the fulfillment of the degree of bachelor in Geography, Department of Geography, Government Degree College for Women, Bahawalnagar 2014.

[5] Burrard SG, Hayden HH. A Sketch of the Geography and Geology of the Himalaya Mountains and Tibet. (2nd edition). Government Printing Press, Calcutta, Government of India, India 1907.

[6] Malik AA. Apni Taqdeer Ka Satluj Nahin Behne Wala (Fate less Sutlej will never been flow in future). Daily Jang, Multan. 2013; p.12.

[7] Thorpe E, Thorpe S. The Pearson General Knowledge Manual. Dorling Kindersley private limited, Delhi, India 2013.

[8] Abbasi BA. Geographiai maloomat, Encyclopedia (Geographical Information, Encyclopedia). Urdu Science Board, 299- Upper Mall Road, Lahore 2002.

[9] Chandio BA, Yasmin MN. Proceedings of the National Workshop on Water Resources Achievements and Issues in 20th Century and Challenges for the Next Millennium. Pakistan Council of Research in Water Resources (PCRWR) June 1999.

[10] Iqbal MJ. Ilmi Objective Geography, Ilmi Kitab Khana, Kabir Street, Urdu Bazar, Lahore, Pakistan 2016; 117-121.

[11] GoP. DCR of Bahawalpur 1998. Islamabad: Population Census of Pakistan (PCP), Ministry of Interior (MOI), States and Frontier Regions, Government of Pakistan, Islamabad 2000.

[12] Nol MMB. *Tazkara Pansath Baras Ka* (Description of Sixty Five years). Bahawal Chenab Publishers, Maher Adnan Faisal, 9 BC, Baghdad, Bahawalpur 2013.

[13] Spate OHK, Learmonth ATA. India and Pakistan, land, people and economy (3rd ed.). Alpha sky printers, Liaquat road, Rawalpindi 1972.

[14] Iqbal MJ. Impact of Sutlej River Abandoncy on the Socio-Economic Shift of the Adjacent Areas, A Case Study of Jhangi Wala, Bahawalpur. An Unpublished M. Phil Thesis, Department of Geography, Baghdad –ul- Jadid Campus, The Islamia University of Bahawalpur, Pakistan 2014.

[15] Fox CS. Physical geography for Indian students. Macmillan and company limited, St. Martin's street, London, Great Britain 1942; p. 318.

[16] Fahlbusch H, Bart Shultz, Thathe CD, Eds. The Indus Basin: History of Irrigation, Drainage and Flood Management. ISBN: 81-85068-77 ICID Publication, New Delhi, India 2004.

[17] Davies LM. Geographical changes in North- West India, Proceedings of the 6th Pacific Science Congress. University of California Press, Berkeley 1940; 483-501.

[18] Iqbal MJ, Anwar MM, Mohsin M. Adopting Technical Actions for the Sutlej River Revival: A Geographical Approach. Sindh University Research Journal (Science Series) 2015; 47(4): 809-812.

[19] IGI. Imperial Gazetteer of India. Sang-e- meel publications, 25- Shahrah-e- Pakistan (Lower Mall) Lahore 1998.

[20] Wasti SZA. Bahawalpur ki sarzameen, Aik Tarikh (Land of Bahawalpur, A Historical Approach). Beacon Books, Gulgasht, Multan 1993.

[21] Shams FA. Land of Pakistan, Geography, Resources and Environment. Kitabistan Publishing Company, 38 - Urdu Bazaar, Lahore 2005.

[22] Wilhemy H. Zeitschrift fur Geomorphologies, Sup. band 8, 1969; 76-91.

[23] Din MM. Gazetteer of the Bahawalpur State with map 1904. Sang-e- meel Publications, 25- Shahrah-e- Pakistan (Lower Mall) Lahore 2001.

[24] Stein A. Ancient evidences of Sarasvati River. Journal of Bengal Geographical Society, Kolkata, India. Number 92, 1942.

[25] DCR. DCR of Bahawalpur 1972. Islamabad: Population Census of Pakistan (PCP), Ministry of Interior (MOI), States and Frontier Regions, Government of Pakistan, Islamabad 1977.

[26] Thathvi MAS. Tuhfat –ul- Karam (Gift of Karam). Sindhi Adbi Board, Hyderabad, Sindh 1959.

[27] Tahir M. Riasat Bahawalpur Ka Nazm-e- Mumlikat, 1866-1947 (Kingdom administration of Bahawalpur State, 1866-1947). *Bazm –e- Sakafat*, Multan 2010.

[28] Dani AH. Indus Civilization- New Perspectives. Centre for the Study of Civilization of Central Asia, Quaid -e- Azam University, Islamabad 1981.

[29] NHA. Achievements of NHA During Past Five Years (2008-12): Transport and Communications. National Highway Authority, Islamabad 2012.

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