

**TRADITION AND MODERNITY:
PERSPECTIVES ON IRRIGATION
DEVELOPMENT IN THE BAHAWALPUR
REGION (1866-1900)**

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Abstract

This paper examines the process of transformation from traditional practices of irrigation to the modern and calculated water system in the princely Bahawalpur. The sources of irrigation that existed in this area were mainly wells, deluge channels and surface flow that actually, the old irrigation structure required an extensive social participation based on local practices while modern system introduced by the British was governed by a centralized bureaucratic management based on scientific utilization of resources, in order to generate revenue. The patterns of the new framework; documentation, statistics, area measurement, and masonry structure were also induced. Mapping the configurations of native policies, the study addresses two questions; how the State brought conversion in the traditional water structure and improvements in water sources; what was the role of rural communities in irrigation management and how they assimilated the latest trends of that time.

Keywords: traditional irrigation, colonial hydrology, chherrbandi, modernity, development.

1.1. Introduction

The economy of India was largely agrarian based on traditional sources of irrigation. In the nineteenth century, the indigenous irrigation patterns subsumed the modern and professional practices introduced by the colonial power. As David Gilmartin postulates:

North-west India was one of the great experimental centers for irrigation engineering in the late 19th century - and one in

which science and professional engineering played a major role.

Simultaneously, the focus of colonial investment was turned to irrigate the semi-arid regions and the interfluves particularly in Sind and Punjab. The princely state of Bahawalpur was one among the semi-arid regions under the administration of Punjab. Established in 1727 by the Daudputra tribe of Sindh, Bahawalpur appeared as a notable area in the southernmost part of Punjab. This area was administered by different authorities as Multan, Sindh, Bikaner and Jaisalmer. Daudputras succeeded in composing the disintegrated area into a single unit with hereditary form of government. They cherished their new abode and invested their energies in its physical and social development. This socio-political change had a profound impact on the ecological character of this realm.

Laying at the base of Punjab and having 483 kilometer conjoint river border of Indus, Chenab and Sutlej, Bahawalpur had great potential for extensive irrigation. The physical structure of the State was composed of three alluvial tracts adjacent to one another. The first tract comprised the fertile and populated uplands along the river Sutlej, and combined waters of Indus and its five tributaries.ⁱⁱ The central portion consisted of low lands of loamy soil with sparse nomads. The third, southernmost zone was called Cholistan that was pure desert and consisted merely of sand dunes. The climate was hot and dry with marginal rainfall. This geophysical environment of the region provided an ideal base for canal irrigation that was commenced by the nawabs and developed at the initiative of the Agency government.ⁱⁱⁱ

The State came under The British administrative control in 1866. The British interceded in the state in 1866, when the *de facto* Nawab expired in a civil combat and his successor prince Sadiq Khan was a minor, and therefore, the British assumed the charge of the State till 1879. Again, in 1899, the British took over the administration of the State due to the death of Sadiq Khan-IV (1861-1899) till 1903. After a short interval of native rule, the State again went under British management in 1907 and remained until 1924. In all three phases, the Government of India carried out the management of the State through a Council of Regency.

1.2. Traditional Irrigation in the Bahawalpur Region

Primarily, the land along the river banks was irrigated by seasonal deluge, but with time, irrigation was extended to other nearby areas. There were multitudes of indigenous works, which existed since long. The peasants were accustomed to utilize the natural creeks and depressions to irrigate their fields. These depressions were locally called *dhunds*. To expand the irrigation, the water was carried through small

channels, which were subdivided into tiny streams.^{iv} Because water surface level in the rivers remained always high in summer, therefore the native rulers constructed the *bunds* or stop dams to protect the areas from flood. These *bunds* were temporary and sometimes washed away by the high flow of the river.

The initial canal structure, gradually developed with the full participation of irrigators therefore, the nature of those canals was *zamindari*. The first *zamindari* canal named *Qaimwah* was constructed in 1747 by a tribal chief Qaim Khan. While the first canal by the Abbasids was *Khanuwah* excavated with the establishment of Bahawalpur town in 1748. In the same year, an old canal *Dajla*, originally constructed during the reign of Aurangzeb Alamgir (1656-1707), was reopened with the name of Nurangwah.

Simultaneously, other tribal chiefs dug out many canals in their own principalities.^v In the old water system, the construction of the canals had a close link with political stability and a peaceful regime,^{vi} such as the reign of Amir Mubarak Khan (1749-1772), was free from any sort of political disturbance, therefore, it allowed for the construction of large canals; Sabzalwah, Ikhtiarwah, and Ahmadwah. The new constructions were greater than the previous ones. The history of every canal was a successful step by the local community against the heavy flashes of river.

Thus, an irrigation structure gradually evolved but with certain limitations. Actually, all canals were originally natural drainage channels, which extended in the form of inundation canals. These channels were sufficient to irrigate a limited area for a sparse population but as the potential of both variables enhanced, these created many difficulties for the system, mainly the unstable heads were responsible for breaking the link break between river and canal supply.^{vii} The existing system also lacked expertise to deal with the new environment of water competition created by canal excavations and the extension of agricultural land. This lack of sound specification was more common and acute in the other inundated areas of Punjab and Sindh.

However, the State maintained an indigenous water structure of its own. Before the Agency administration, there were 38 canals. Out of which, 26 were drawn from the Sutlej, 6 from the Chenab and 6 from the Indus.^{viii} The irrigation arrangements were limited to the old proprietary areas. The *kardaris* of Khairpur, Bahawalpur, Ahmadpur, and Noushehra had more share in canal building while Minchinabad had only one stream. The pre-Agency canals had a total length of 1315 kilometers. The combined discharge from all such canals was estimated at roughly 20,000

cubic feet per second at the peak of flood. In winter, this draw off was half of that quantity.^{ix}

1.3. Institutional Transition in Irrigation under Colonial Rule

At the initiative of the British Agency government in 1866, a strong institutional evolution originated in the irrigation infrastructure. The initial motive was that public irrigation could serve the country far better if it pursued a strategy to reform the irrigation management with greater professionalism and a performance orientation. In 1869, a combined department of Irrigation and Public Works with an engineering section was set up in the Bahawalpur State.^x This engineering branch was novel in India, conceived out of the international discourse on water technology, which was based on the conversion of water as a commodity.

In this context, the hydraulic engineers, were all were civil servants of the British government, appointed on the Indian irrigation projects to construct the canals on scientific lines.^{xi} Moreover, during the period from 1870s to 1940s, the Government of India made large investments in the Indus Basin irrigation to utilize its agricultural potential for the development of its economic sector.^{xii} This global environment influenced the emerging irrigation patterns in the Bahawalpur State on one hand and on the other hand, these were based on the native collaboration in canal building.^{xiii}

The Irrigation and Public Works departments were working together but with separate responsibilities. The early character of the canal department was that of an advisory organization. Its primary concern was limited to prepare longitudinal section of existing canals and to assist the civil officials with technical advice in leveling and surveying the new canals. The excavation and clearance of canals was the responsibility of Public Works, which was further responsible for preparing plans, sanctioning the estimated sum and handing them over to the *nazim* who was in charge for executing the canal work by engaging the community. In this way, the collaboration with the inhabitants was the nucleus of the system.

The changes in the administrative structure over time improved the irrigation sector. In 1905, the irrigation and the revenue functions were separated from Public Works departments and the post of *Mushiri-Anhar* was created with a separate establishment.^{xiv} In 1912, the canal section passed from the revenue officers to canal engineers.^{xv} This organization was to cope with the trends of the time, which ultimately was a step towards perennial irrigation that started in 1920s. However, the early local practices were the basis of the new science under the British administration.

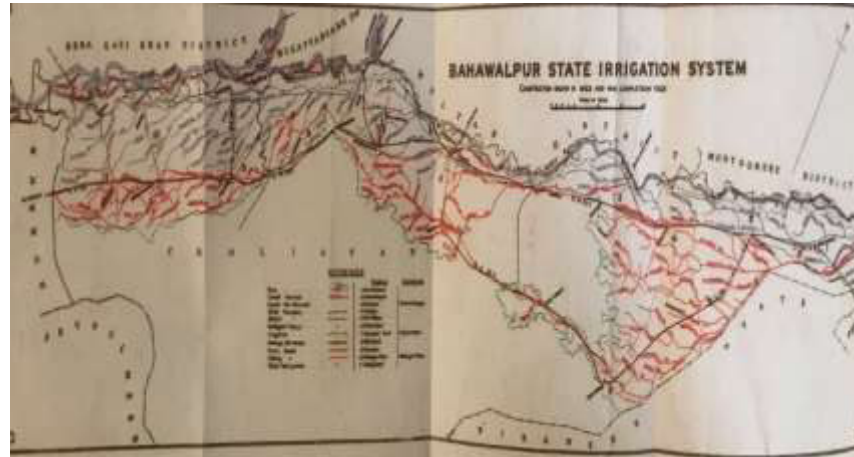


Figure 1: Map of Irrigation System of Bahawalpur State

Source: Muhammad Akbar Malik, *Bahawalpur Mein Bahali-i-Subah Ki Tehrik: Aik Tajziati Mutalia* (Multan: Bazm-i-Saqafat, 2011).

1.4. Traditional Sources of Irrigation and Modernity

Behind the irrigation structure building, the purposes were essentially social and political in nature. The objectives set by the Agency were mainly to increase irrigated-agriculture and to bring financial returns for further expending on public works. Therefore, the caretaker government proceeded to maintain and upgrade the available small-scale sources of local irrigation. Customarily, the land in revenue documents was distributed according to the sources of irrigation. Figure 2 displays a picture of land distribution. It shows that share of pure well land in this distribution seems the least, surface flow has the medium while canal land gets the highest share.

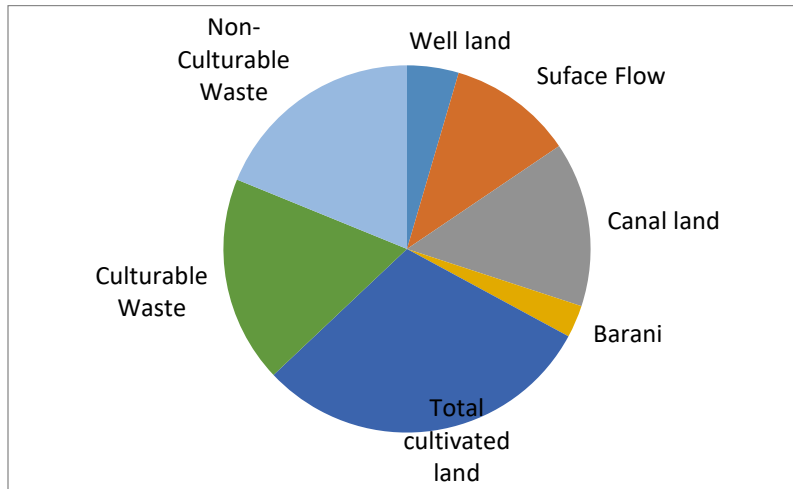


Figure 2: Land Distribution According to the Sources of Irrigation in 1867.

Source: *The Government of Punjab, Re-Organization Report of the Bahawalpur State 1867, P. 75.*

Basically, there were three broad classes of irrigation; wells, seasonal inundation and deluge canals.^{xvi} The Agency concentrated on the improvement of all three kinds of areas. Wells were the oldest form of irrigation used for both complementary irrigation and domestic purpose. Wells were important to buttress any decrease in supply from the rivers and were indispensable auxiliary of deluge irrigation that would defuse the chemical impurities and improve the level of waters, therefore they existed throughout the populated areas.^{xvii} However, pure well land was found only in the riverine tract of Bahawalnagar where water level in Sutlej was normally high. The cultivation on well land was more valuable because it was fit for commercial crops therefore, it had always been assessed at a higher rate.

According to the new system, the land ceiling for each source was fixed. An ordinary limit for cultivation on well land was 30 acre whereas on canal land, it was 60 acre and on flooded land, it was 80 acre. In the dry season, the average in all cases was reduced by one-third.^{xviii} This meagre span of well area was due to the operational dependence on bullock power. Since irrigation from wells was costly and time consuming, therefore the Agency government provided many incentives. Mainly, it sunk many wells on its own and sold them to the *zamindars*.^{xix} Further, it provided loans to cultivators without interest and easy installments. Newly constructed wells were exempted from water rates

for 12 years. Resultantly, landholders were encouraged and paid sufficient amount for the construction of wells. From 1878-79 to 1898-99, the *zamindars* had spent 512084 rupees on well sinking. With the introduction of perennial canals, wells were frequently used to supplement the poor water supply until the advent of tube well technology.^{xx}

The *sailaba* or flood land was available in the tracts contiguous to the river. This natural source was the least expensive but the supply was available for the summer cultivation only. Historically, there were three major natural overflow points in the State that irrigated sufficient area of their concerned *tehsils* during the flood season. First overflow was above the junction of Sutlej and Chenab near Uch and expanded eighty kilometers towards Khanpur in the Southwest. Second overflow was near the junction of Chenab and Sindh twenty eight kilometers from Uch, covering from three to sixteen kilometers of land. Third overflow took place on Indus just above the Subzalkot and would spread over twenty four kilometers in the State before flowing towards Sindh. The combined discharge from these overflows was 30,000 cubic feet per second and almost all was absorbed in the land.^{xxi}

The land nourished by overflow had always been more productive and more retentive of moisture. But such watering was irregular, only possible during flooding and only lower riparian owners could take full advantage of it. In 1867, *sailaba* area was 10, 41, 508 acre, which by 1883, had increased to 20, 81, 868 acre. By 1900, it decreased to 12, 97, 248 acre, owing to the shortage of water subsequent to the construction of the perennial canals in Punjab.^{xxii} This source of irrigation largely shrank down with the advent of weir control system in 1924. Furthermore, there were some natural creeks in the interior of the State. Eleven small storage dams or reservoirs were constructed out of these water beds. To irrigate the elevated tracts of lands from the reservoirs, a lift, locally called *jhallar*, was used, which raised the water by the Persian wheel.

The native political agent, Murad Shah Gardezi, introduced the *jhallar* system first in the Minchinabad nizamat, where 600 *jhallars* were constructed on the Fordwah canal to feed the uplands. Later, this system expanded to the districts of Bahawalpur and Khanpur.^{xxiii} By 1867, 1249 *jhallars* were working.^{xxiv} In 1872, these were reduced to 900 owing to the improvement in the leveling of canals.^{xxv} On a very small scale, a lever operated lift, locally called *dhekla*, was also introduced. However, the lift irrigation was very expensive and used only for those places,

where banks were spoiled and the use of the Persian wheel was impossible.^{xxvi}

1.5. Inundated Water Structure and Modernity

The modern canal-based irrigation was planned at the initiative of the Agency government. In fact, the long river frontage in the State provided a large scope for artificial irrigation. As;

“...the whole State (with the exception of well-cultivated and the land submerged by the rivers during floods) would be reduced to desert and therefore, it is only in a country of its kind where the blessings of canal irrigation can be properly understood and appreciated.”^{xxvii}

The first effort of the Agency was directed towards the overhauling of existing canal structures that was undertaken in two steps. The initial emphasis was on the maintenance and operation of native canals by using new technology and technical monitoring, and afterwards the new work was undertaken.^{xxviii} The upgrading embankments, erection of benchmarks and construction of sluices, conduits, and culverts, added a modern touch.^{xxix} The canals were provided with regulating bridges and stop dams, which controlled the discharge during high floods. The regular reading of water gauge was registered on the newly constructed canals. The head regulators were fixed for all the State canals to control the flow of water and secure the crops from the flood damages. All details regarding measurement of the discharge and distribution were to be maintained. For the observation of the discharge, local educated youths were employed.^{xxx} The inundation canals were limited to the valley of Punjab and Indus, and to the lower part of Sutlej.

There was complete remodeling of all existing channels in terms of alignments, gradients and leveling. From the main canals, distributaries and minor channels were drawn to distribute the water to the fields. Larger branches of Minchinwah and Sadiqwah canals in Khanpur *tehsil* were re-adjusted to irrigate the intervening tract. In Ahmadpur Lamma, two canals Bahadurwah and Ahmadwah were extended. Moreover, new water heads on principal canals of Hussainwah, Naurangwah and Khanwah were constructed.^{xxxi} In fact, increasing irrigated agriculture to increase the revenue was the primary objective for which the State was ready to spend additional money. In this regard, Colonel Grey, the Political Agent of the State (1871-1879 and 1899-1908) recommended to the government of Punjab that the Bahawalpur

State would bear half of the expenses of railway, if railway authorities built protective works on Sutlej.^{xxxii}

The capital cost of improved work was funded with the assistance of the landowners.^{xxxiii} Actually, the cultivators being inhabitants of a rainless region fully realized the value of water. They showed great zeal in prosecuting canal clearance and opening new cuts in existing canals. They paid for the cost of the extension and the repair, while the State bore the expenditures on the improvements of the water heads, and the gradients. In addition, the construction of *rajbahs*, bridges, and sluices was also financed by the State. This early extension work engaged ten thousand men from the State.^{xxxiv} Besides, a large number of labourers from Bikaner were employed on the States' canal work. Moreover, the prisoners from the State jail were employed for the minor work of canal improvement.^{xxxv}

Having improved the existing canals, new work was initiated under the engineering branch of the irrigation department. In the new environment, the administrative power and water provision were closely associated with each other and the State expended a great deal of capital in fortifying this relationship. For irrigation projects, 1/8th of the average yearly income was set aside.^{xxxvi} The pattern of irrigational investment in all three nizamats is almost similar. In Khanpur district, new canal of Burnswah from Chenab irrigated the whole district. Sadiqwah fed the area of Sadiqabad and Noushehra *kardari*. Hussainwah, Sardarwah, Qutabwah, Tolawah, Khanwah, Sultanwah and Fordwah were continuously supplying water in the cold months except during the silt clearance period.

The Fordwah and Sadiqia twin canal system were the most contributing factor for the agrarian development in the eastern part of the State. Under the first Agency, 1303 kilometers of new canals and their branches were scientifically constructed.^{xxxvii} In the late nineteenth century, the State owned 26 big canals, 195 branch canals and 24872 distributaries drawn from Sutlej and Punjnad.^{xxxviii} The total area irrigated by the canals increased from 34702 acres in 1867 to 841207 acres in 1900.

1.6. Community Management or *Chherrbandi*

In the traditional water system, the task of annual silt clearance was the major responsibility of the landowners. River water left a rich deposit of fertile silt, which had to be moved by the peasants to induce a better flow in the canals. This procedure was accomplished through *chherr* tradition and this practice was called *chherrbandi*.^{xxxix} This system

was a distinct feature of the canal irrigation in Northern India and was chiefly prevailed in Punjab and Sindh. The premiere communities of canal irrigators emerged in the early phase of the State and each sharer became responsible for providing unpaid labour proportionate to his wells, or irrigated area. The State's role was just to assist the supervisory body, comprising villagers and headman.

The Agency regime brought about a major transition in the basic structure of the canals and all the controlling and authoritative rights over the system vested in the State. The State held control over regulation of water supplies, distribution, and management. With the State control both the State and the landowners became partners in irrigation as their partial involvement in the canal work was a necessary feature of the system. The new system provided legal basis to *chherrbandi* and this property-based management retained its control over the organization and maintenance of the canals up to the early twentieth century. However, with State control in irrigation matters, the organization of silt clearance became an official concern.

To supervise the *chherrbandi* on each canal, two officials were appointed: *Mir-i-Aab* and Honourary *Munsif*. In order to keep the record of labour, a *muharrer* was appointed at each canal and the *kardar* had the responsibility to organize and supervise the *chherr* labour at *tehsil* level.^{xl} The necessary document in *chherrbandi* was 'the statement of task assignment'. It contained the record of cultivators and their part of task in canal work along with the data of defaulters and their fines.^{xli} The *chherr* labour was engaged to redeem the silted canals through a fixed quota, which was usually one man for thirty acres of cropped land. However, the State granted aid in case of unusual silt deposit.^{xlii}

Despite the professional management orientation among the irrigators, some malpractices did exist through secret dealing with the lower bureaucracy. The influential persons usually got off the clearance quota and marginal peasants fell in trouble.^{xliii} To subdue these practices, this system was also remodeled. The major improvement introduced in the *chherr* system was the introduction of duck system based on the estimation of cubic contents instead the number of labours. In this method, the canal length was partitioned in pieces called *ducks*. These *ducks* were allotted to landowners to be cleared within the fixed period.^{xliv} The bench marks at every 330 feet in the bed of all canals were fixed. This method was very reasonable and brought about quick execution of work on the part of the landowners by engaging more men.

The sharing of water by cultivators was generally based on *warabandi*, a rotational method of water delivery and allocation. The

share of cultivators was called duty and it was based on the notion of fixing the rotational turns for water as per size of holding and distance from *mogga*. The duty of water had always encompassed multiple measures, standards, values, and justifications. It involved the distribution of water in an equitable manner over the maximum area irrigated.^{xlv} With the reorganization of the State in 1905, the *warabandi* system was also reorganized and each kind of crop was allowed water for three times, and if more was required, *chherr* was to be doubled. The duty of water varied primarily with the nature of crops, as rice needs more water than indigo and indigo more than wheat. Average duty was 45.6 cusecs per acre. In fact, the economy of distribution depended upon the proper working of regulators and masonry outlets as well as the honesty of the distributors of water – the *Mir-i-Abs* who treated water sharing as a control entity.^{xlvi}

However, with the extension of irrigation, *chherrbandi* also became harder to manage, as the landowners with their tenants had to move miles away from their homes, where they stayed in temporary sheds for the whole winter season.^{xlvii} The solution to this problem was the imposition of water rates, an exercise already in practice in the British Punjab. The *chherr* system was converted into *abiana* during the reign of the Nawab Bahawal Khan V who was always ready for the adoption of new techniques, implemented in the British Punjab.^{xlviii}

The *abiana* was adopted on experimental bases on the main canals, which were cleared mainly at State expense. Only 10% of the expenses were received from cultivators.^{xlix} Apart from some resentment by landed elites and their partners in lower bureaucracy, the conversion to *abiana* system was generally welcomed by the landowners. Through, the Canal and Drainage Act of 1887, implemented in 1910, the *chherrbandi* was absolutely diminished.¹

1.7. Conclusion

Before the intervention of the British, the water system of the state was based on old customary practices as were prevailing in the other parts of northern India. The old sources of water supply were sufficient for subsistence-based agriculture. Therefore, the traditional irrigation was efficient when need for irrigation was likely to be at its lowest but inadequate to irrigate a wide stretch of land. Moreover, native irrigation was closely associated with the social setup. However, community managed projects had less state control over water system and depended more on the rural society.

The native irrigation had been gradually converted into the State controlled system. Particularly, under the Agency, irrigation became a state managed system. However, the participation of farmers in self-management of canals was maintained. By the time, the control of the State over irrigation matters was increasing and the canal department was reorganized and restructured, which lessened the community participation in irrigation matters. With the new infrastructure, the refurbishment of existing inundation canals was focused along with the new projects. The infrastructure of irrigation department was shaped by the engineering breakthrough. Canal levels were controlled. The construction of regulators, sluices, aqueducts, and culverts was the major essentials of a new technology to use the water economically. Along with that, a strict policy of surveillance and implementation of institutional regulations strengthened the system. With the stability of local irrigation structure, new sources of revenue were tapped. Consequently, irrigation projects brought a change not only in its agrarian economy but also in its demographic distribution and physical appearance. Later on, the saga of perennial irrigation through Sutlej valley project proved to be a tremendous contribution to the development of irrigation.

References

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- ⁱ David Gilmartin, Water and Waste: Nature, Productivity and Colonialism in the Indus Basin, *Economic and Political Weekly*, Vol. 38, No. 48 (November 29- December 5 2003), P. 5057.
- ⁱⁱThe Government of Punjab, *Annual Administration Report of the Bahawalpur State 1870-71*, (Lahore: 1871), P. 1.
- ⁱⁱⁱ Radhika Lal Mehta, *The History of Bahawalpur Canals* (Bahawalpur: 1932), P. 5.
- ^{iv} Captain Wade's Letter written to the Government of India in the Secret Department: No, 25, September 1837, *On the Trade of Bahawalpur by Mohan Lal*, P. 166.
- ^v The first canal was Qaimwah constructed in 1747, by Qaim Khan Arbani in Qaimpur. In 1748, Bahadur Khan Hillali, excavated Nala Bahawalwah, with the establishment of Bahadurpur town. Ahmadwah was excavated in 1758 in Ahmadpur East; in 1759, in Ahmadpur Lammah and in 1763 in Mud Manthaar. See Muhammad Ashraf Gorgani & Mohammad Din, *Sadiq-ut-Tawarikh* (Bahawalpur: Sadiq-ul-Anwar Press, 1866), p. 158-163.
- ^{vi}Hugo James, *A Volunteer's Scrambles through Scinde, the Punjab, Hindustan and the Himalayah Mountains* Vol. I (London: W. Thacker & Co, 1854), P. 70.
- ^{vii} Radhika Lal, *History of Bahawalpur State Canals*, P. 5.
- ^{viii}Malik Muhammad Din. *Gazetteer of the Bahawalpur State with Map 1904-A* (Lahore: Sang e Meel, 2001), P. 243.

- ^{ix} J.W. Burns, Notes on the Physical Geography of the Bahawalpur State, *Journal of the Royal Geographical Society of London*, Vol. 42 (1872), P. 395.
- ^x Mr. Burns and Mr. Bucket were the first Superintendent of Irrigation and Public Works, respectively. See *Annual Administration Report of Bahawalpur 1868-69*, PP. 86-89.
- ^{xi} The Government of Punjab, *Proceedings of Political Department November 1871: Precedence of Bahawalpur Officers*, P. 1096.
- ^{xii} Ashok Swain, Environmental Cooperation in South Asia, eds. Ken Conca and Geoffrey D. Dabelko *Environmental Peacemaking* (Washington, D.C: Woodrow Wilson Press, 2002), P. 66.
- ^{xiii} David Gilmartin, 'Models of the Hydraulic Environment: Colonial Irrigation, State Power and Community in the Indus Basin' in David Arnold and Ramachandra Guha (ed) *Nature, Culture, Imperialism: Essays on the Environmental History of South Asia* (New Delhi: Oxford University Press, 1995), PP. 210-236.
- ^{xiv} *Annual Administration Report of the Bahawalpur State 1904-05*, P. 10.
- ^{xv} The Government of Bahawalpur, *Assessment Report of Minchinabad Tehsil 1947*, (unpublished) P. 17.
- ^{xvi} *Gazetteer of the Bahawalpur State 1904*, P. 239.
- ^{xvii} *A Report Showing how far the Prosperity of Bahawalpur State Riverine Territory has been Injured by the Construction of the Sirhind Perennial Canal*, From Wazir, Bahawalpur State to Colonel L.J.H. Grey, Superintendent Bahawalpur State, Dated 14 October 1900.
- ^{xviii} *Gazetteer of the Bahawalpur State 1904*, P. 241.
- ^{xix} *Annual Administration Report of the Bahawalpur State, 1868-69*, P. 29.
- ^{xx} Muhammad Tahir, *Riasat Bahawalpur Ka Nazm-i-Mumlikat*, P. 343.
- ^{xxi} Burns, Notes on the Physical Geography of the Bahawalpur State, P. 402.
- ^{xxii} *A Report of the Sirhind Perennial Canal*, October 1900, P. 5.
- ^{xxiii} *Annual Administration Report of the Bahawalpur State 1868-69*, P. 29
- ^{xxiv} *Re-Organization Report of the Bahawalpur State*, P. 80.
- ^{xxv} *Annual Administration Report of the Bahawalpur State 1873-74*, P. 2.
- ^{xxvi} *Annual Administration Report of the Bahawalpur State, 1870-71*, P. 9.
- ^{xxvii} Burns, Notes on the Physical Geography of the Bahawalpur State, P. 395.
- ^{xxviii} *Sadiq-ul-Akhbar*, 1st September, 1867.
- ^{xxix} *Annual Administration Report of the Bahawalpur State 1875-76*, P. 80.
- ^{xxx} Radhika Lal, 16. See also *Tejveez Committee Muta'liq Intizam-i-Anhar* on 15th April, 1901.
- ^{xxxi} *Annual Administration Report of the Bahawalpur State 1868-69*, PP. 10-11.
- ^{xxxii} *Proceedings of Political Department, May 1871: Railway Works in Bahawalpur*, P. 892.
- ^{xxxiii} *Annual Administration Report of the Bahawalpur State 1870-71*, P. 9.
- ^{xxxiv} *Proceedings of Political Department September 1869*, P. 268.
- ^{xxxv} *Annual Administration Report of the Bahawalpur State 1870-71*, P. 21.
- ^{xxxvi} *Annual Administration Report of the Bahawalpur State 1875-76*, P. 3.
- ^{xxxvii} *Proceedings of Political Department December 1879*, P. 1263.
- ^{xxxviii} *Annual Administration Report of the Bahawalpur State 1899-1900*, P. 4.

^{xxxix} The Government of Punjab, *Selections from Records: Financial Commissioner Punjab*. No.34. Papers relating to the Canals (Lahore: 1887), P. 366.

^{xl} *Sadiq-ul- Akhbar*, 1st January, 1872.

^{xli} *Financial Commissioner Records*, P. 539.

^{xlii} *Annual Administration Report of the Bahawalpur State 1873-74*, P. 154.

^{xliiii} *Proceedings of Political Department March 1872: Bahawalpur Administration Report for 1871-72*, 501.

^{xliv} *Annual Administration Report of the Bahawalpur State 1876-1877* (Urdu), P. 2.

^{xlv} *Tajveez Committee Mutauliq Intizam-i-Anhar* on 15th April 1901.

^{xlvi} File: 284-A 1900, *Note on Canal Establishment addressed to Mushir –i- Mal by Colonel H Grey dated 12 November 1900*, 1-2. See also *Annual Administration Report of the Bahawalpur State 1911-12*, P. 35.

^{xlvii} Bahawalpur Archive, *Manuscript of Political Proceedings on 6 January 1913*, (Urdu), PP.49-53.

^{xlviii} Radhika Lal. *History of Bahawalpur State Canals*, PP. 19-20.

^{xlix} *Ibid.*

^l *Annual Administration Report of the Bahawalpur State 1910-11*, P. 50.