Sutlej Valley Project of the State of Bahawalpur: Transition from Inundation Canals to Weir-based Irrigation in the Context of Imperialist Policy and Global Upshot

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ABSTRACT

This paper examines the transition and progress of irrigation activity from traditional system to modern and calculated water system. There is almost absence of any historical studies on the course of events that were behind this development and this paper tries to investigate the little known discourse of attaining the new system of weir control irrigation. The study focuses on the correlation and the impact of imperialistic policy and international events particularly the inflation caused by the World War I and the economic depression on the irrigation system of the State of Bahawalpur that greatly burdened its economy. The paper also highlights the State's successful response through a well-crafted politico-economic strategy to the significant financial challenge to the project arising out of these world events. This research is mainly based on published official records and unpublished archival documents.

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Introduction

The State of Bahawalpur was one of the 36 Princely States under the Punjab administration.[1] The gross area of the State was 15,918 square miles, of which 9881 square miles consisted of desert. The State was bordered on the Northeast by the British district of Ferozpur and on the East and Southeast by the deserted portion of native states of Bikaner and Jaisalmer. On the North, it was surrounded by river Sutlej that separated it from Multan and Montgomery districts of the Punjab. On the West, a natural boundary of combined waters of five rivers of the Punjab separated it from Muzafargarh district of the Punjab while on the South-West it was touched by the province of Sindh.[2]

The physical geography of the State had two distinct paradoxes. On the one hand, its two-third territory consisted of sandy desert called Cholistan, which is a part of the great desert of the Subcontinent. On the other side, the State had a frontier of 300 miles of Sutlej, Chenab and Indus rivers. But none of the State's canal was perennial. This river line was the only means of survival for the people of the State. Cultivation in the State was largely dependent on irrigation by natural tributaries formed by, or deluge channels taken from, these rivers. These inundating canals had no control at the off-take point to limit the quantity of water and wreaking abnormal supplies, which caused the destruction to crops. The close proximity of rivers, intensity of weather in term of dry climate, hot temperature, and less rainfall all combined created a vast potential for artificial irrigation system in the State. The native rulers had some indigenous plans at local level. The Nawab Bahawal Khan V (1903-1907) proposed a scheme of a weir at Hasil Sarhhu to irrigate an area of 34500

1 The Government of Punjab, *Report on the Administration of Punjab and its Dependencies for Year 1881-82* (Lahore: 1982), 1.

2 Henry Field, *An Anthropological Renaissance in West Pakistan 1955: with Appendixes on the Archaeology and Natural History of Baluchistan and Bahawalpur* (Massachusetts: Peabody Museum Cambridge, 1959), 145, 147. However, this area was increased to 17158 square miles in 1939 due to the alluvium rules.

acres in the desert. However, due to technological constraint at that time, it did not prove feasible.[3]

It was in this context that the Government of India (here after GOI) with its administrative dexterity and advanced technology, decided to utilize the irrigation potential of the Indus River basin, particularly that of the plains of the Punjab and Sindh in the late 19th century. By the early 20th century, rest of the rivers in the Punjab were canalized except for a nominal area, however, the 60 percent of water still ran out as waste in the Arabian Sea. Therefore, focus of the GOI was towards the unoccupied plains and vast areas in the desert. In this context, Sutlej Valley Project was a joint venture of the British Punjab and the princely states of Bikaner and Bahawalpur to provide weir control irrigation to the waterless zones of the three states.[4] Sutlej Valley Tripartite Agreement was the binding pact and substantially the first agreement over the sharing of water in the Indus Basin. However, it was projected at a time when the World War I put financial stringencies on the overall economy of India and carried out during the years of Great Economic Depression. Therefore, this project also wreaked unexpected fiscal difficulties. This mega plan, irrespective of the strains it caused, provided weir control irrigation and converted the wastelands for all three shareholders into a productive area. However, to obtain the fruits of the scheme, Bahawalpur State went to significant struggle than the other co-partners of the project had to endure.

Genesis of the Project

The modern era of the development of large-scale irrigation system has its roots in the 19th Century development plans for the area initiated by the British in India. First plan for the utilization of Sutlej water was formulated by the East India Company (hereafter EIC) in 1854, when Lieutenant

3 Dunlop Smith, *Diary of Political Agent*, Vol. III (Unpublished), (From April 1, 1903 to March 31, 1904).

4 H.G. Trevaskis, *The Economic History of Punjab*, Vol. II (Gurgaon: Vintage Books, 1989), 267.

Anderson proposed a weir on Sutlej near Ferozpur. However, this suggestion was abandoned for its high cost.[5] With the transfer of power in 1858, the GOI undertook different irrigation projects to boost the agricultural economy of India to consolidate their rule. Further, the occurrence of severe famine in India stimulated the need for large irrigation based plans for greater food production.[6]

The GOI decided to convert the Indus plain into area suitable for cultivation and to open the agricultural frontier towards the wasteland of the Punjab. Upper Bari Doab and Sirhind canals in late 19th Century were the steps in this direction. The genesis of Sutlej Valley scheme can be traced to year 1901, when the Irrigation Committee of India concluded a decision that waters of Sutlej and Beas should not be utilized to the right bank of Sutlej, where the land received irrigation by Jhelum. Instead, waters of both the rivers should conserve for the wasteland on left banks. This decision paved the way for further plans.[7] To that end, the GOI appointed Mr. Glass to survey the proposed areas of the project. Mr. Glass conducted a detailed soil survey between 1906-09 and 1912-13, in the desert areas of Bikaner and Bahawalpur. According to his report, irrigation had to be limited to 1621764 acres inside the State because the remaining part was surrounded by sand hills and was impossible to irrigate.[8] Suddenly, the availability of water caused a big controversy between the Punjab and the Princely States of Bahawalpur and Bikaner. The Bahawalpur State, as a lower riparian and being the owner of 300 miles river frontage, was the major partner in all the schemes. It had reservation on the inclusion of Bikaner because it would

5 The Government of Punjab, *Punjab District Gazetteers* Vol. XVIII-Montgomery District with Maps 193I (Lahore: 1935), 54.

6 Ian Stone, *Canal Irrigation in British India: Perspective in Technological Change in a Peasant Economy* (Cambridge: Cambridge University Press, 1984), 4.

7 John Benton, "Irrigation Works in India," *Journal of the Royal Society of Arts* 61, no. 3160 (June 13, 1913): 721.

8 The Government of Bahawalpur, *Report of the Sutlej Valley Project Inquiry Committee* (Lahore: 1932), 1-3.

bring the reduction in its proportionate of water that was already diverted to Punjab canals.

Ultimately, the GOI deputed an executive engineer, Mr. Shirra Gibb, to prepare the final report about the project. He seconded Mr. Glass's opinion and proposed a weir at Ferozepur with a canal to irrigate the British territory, i.e. Punjab province, Bikaner and Bahawalpur. Another canal on the right bank of Sutlej was added to irrigate the Nilibar in the then Montgomery district. In this plan, 40.8 percent of the proposed area was British territory, 18.0 percent for Bikaner and 41.2 percent for Bahawalpur. On the lines of Gibb's report, a tripartite conference was held at Delhi and all parties accepted the main features of the plan.[9] The Sutlej Valley Tripartite Agreement was substantially the first agreement over the sharing of water in the Indus Basin.

Final Project of 1919

On the findings of the Gibb's Report, Sir Thomas Ward, the Irrigation Inspector of India, recommended a plan that became the forerunner of the final scheme. It comprised three weirs on Sutlej River at Ferozpur, Sulemanki, Islam and fourth one at Punjnad on the confluence of Sutlej and Chenab. On the right bank of Sutlej, three canals were undertaken in the British territory at Depalpur, Mailsi and Pakpattan. On the left bank, six canals of the Bahawalpur State — Sadqia, Fordwah, Qaimwah, Bahawal, Abbassia and Punjnad were planned in addition to the one canal for the Bikaner State.[10]

The project was sent to the Bahawalpur government for final approval. At that time, the Bahawalpur State was being administered by a Council of Regency due to the death of the Nawab and the Crown Prince being a minor.[11] The State

9 The Government of Bahawalpur, *Report of the Sutlej Valley Project Inquiry Committee*, 3, 7-8.

10 A Report by Thomas Ward, Inspector General of Irrigation in India on Sutlej Valley Canal Project, (1920), preserved in Bahawalpur Archives, 15.

11 The Council of Regency was a political settlement until the minor prince reached its maturity. There were three cases when the Government of India

engineers, particularly Mr. John Benton the technical advisor of the State, had some reservations that the project was devoid of primary data regarding surveys, estimates and expenditures. The State engineers further objected to the expenses, which had been grossly underestimated while water supply was being overestimated.[12] Therefore, the Council of Regency was reluctant to accept the plan but ultimately, it decided to accept the decision of the government being the protector of the interests of the State. The final project was signed in 1920, by the troika of Bahawalpur, Punjab and Bikaner. In December 1921, the project was sanctioned for immediate commencement in 1922.[13] Table 1 gives a detailed account of estimates.

Table:1. ESTIMATES IN THE ORIGINAL PLAN OF 1920

State	Area in Acres				Total irrigated area	Cusecs	Cost in Rupees
	Perennial		Non-perennial				
	Gross area commanded	Irrigated	Gross area commanded	Irrigated			
Bahawalpur	2000000	1231820	2866701	1592798	2824618	12504	71824335
British	900000	501620	2880846	1440423	1942043	14963	50091551
Bikaner	544520	340870	--------	----------	340870	2144	20121121
Grand Total	3444520	2074310	5747547	3033221	5107531	29611	142037007

SOURCE: Government of Punjab: Irrigation Branch, Sutlej Valley Project, June, 1920, iii- iv, 4. See also, Thomas Ward Project 1920, 7, 12.

Worldwide Phenomena and Revised Project

Immediately after the commencement of the plan, World War I generally caused inflation throughout the world. The price of land and the cost of work and materials increased

executed the affairs of the State through the Council of Regency. In 1866, the Nawab, Bahawal Khan IV (1837-1866) died during a civil war and the prince Mohammad Sadiq Khan was a minor, therefore, the British assumed the charge of the State till the maturity of prince in 1879. After some interval of the native rule, in 1899, the British again took over the management of the State owing to the death of the Nawab, Muhammad Sadiq Khan IV (1861-1899) till 1903. In 1907, the State again came under the British control until 1924.

12 The Government of Bahawalpur, "A Review on Sir Barnard Darley Project by Prime Minister of Bahawalpur" (unpublished, copy reserved in Bahawalpur Archives), 6.

13 Report of Inquiry Committee, 6-7.

massively while the exchange prices fell.[14] The value of agricultural products in the Indian market was decreased by 50 percent during depression years.[15] In general, the prolonged fall in agricultural prices affected the agricultural regions and communities the most.[16] In order to find quick economic returns through water extension, the GOI at that time hurriedly sanctioned three huge canal projects: Sukkar Barrage in Sindh (1923-1932), Sarda Canal in the United Province (1920-28) and Sutlej Valley Project (SVP) (1922-30) in the Punjab.[17] Each of the three schemes had commanded a large area. It was unfortunate that these schemes were sanctioned in the chaotic days of war and came into operation during the slump years of 1930s. As Sir Barnard Darley postulates about all three schemes that "None of them has worked up to expectation and the crushing load of interest charges has made it doubtful if any of them will be remunerative for many years to come."[18]

The Great Depression of 1930s caused irreparable damage to the economies in Europe and North America and affected India as well. By the start of 20th Century, the global economy became integrated and the effects of the economic depression in one part of the world generally causes panic to the other parts of the world causing sufferings to the production, income and other sectors of economy. In India, the decade of 1920s was the height of market integration.

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14 The Government of Bahawalpur, Department of P. W. & Revenue, "Annual Report of Agriculture 1926-27 (Sutlej Valley Project)," (Unpublished), File No. 18-v, (1928), 5.

15 Barbara Daly Metcalf and Thomas R. Metcalf, *A Concise History of India* (New York: Cambridge, 2006), 198.

16 B. R. Tomlinson, *The New Cambridge History of India: The Economy of Modern India 1860-1970*, Vol. III-3 (Cambridge: Cambridge University Press, 2008), 90.

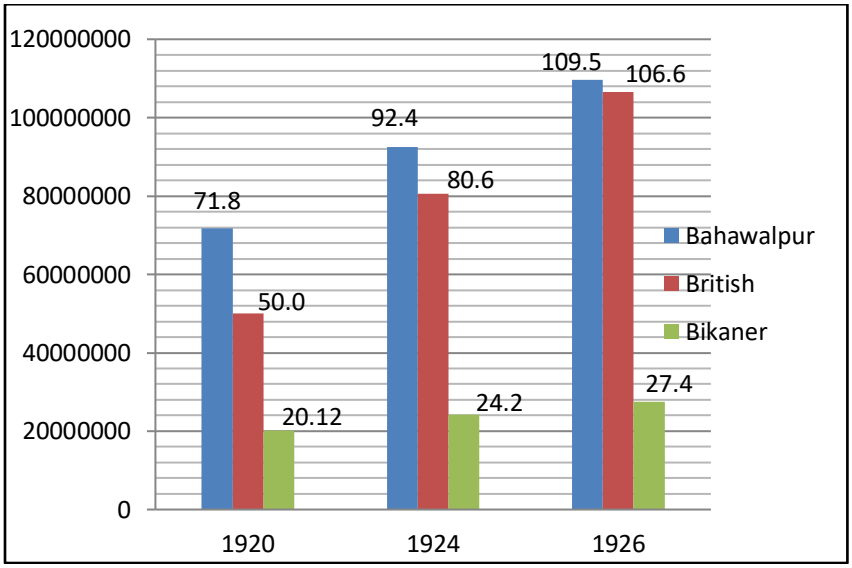
17 Sukkar Project irrigated the area of 7.5 million acres. See for details, Aloys Arthur Michel, *The Indus Rivers: A Study of the Effects of Partition* (London: Yale University Press, 1967), 110.

18 However, the estimates in Sukkar and Sarda canals did not exceed 5 percent while in Bahawalpur there was 63 percent increase over the original estimates. See Barnard Darley, "The Development of Irrigation in India," *Journal of Royal Society of Arts* 90, No. 4602 (December 12, 1941): 47.

The global depression and war broke down the marketing and credit supply system in India.[19]

Thereafter, the Government of Punjab (hereafter GOP) had to revise the cost of SVP twice in 1924 and in 1926 but both revisions brought great increase in the budget estimates and basis of the original data was entirely changed. The following graph shows that the total expenses were 35.17 percent and 63 percent more than the original estimate in the first and second revision, respectively.[20] While the estimates in other two schemes of Sukkar and Sarda canals were not affected much and did not exceed five percent of the original cost.

Figure 1. Increase in the Cost of SVP in the Revised Plans (Increase in Million Rupees).



SOURCE: The Government of Punjab, *Public Works Department: Irrigation Branch, Sutlej Valley Project 1924*, Vol. 1, 2. and Sutlej Valley Project 1926, Vol. 1, 2.

After the lapse of many years, the GOI recognized that the cost of the project was too high and land under irrigation was

19 Daly Metcalf and R. Metcalf, *A Concise History of India*, 155.

20 The Government of Bahawalpur (1927) "Administration Report of Bahawalpur State: 1926-27" (Unpublished), (Sutlej Valley Project), 5.

too small than the anticipated.[21] Likewise, supply was insufficient and sale of land was very disappointing compared to the financial forecast.[22] This miscalculation crippled the project from the inception, caused financial difficulties for the State and left a legacy of unsolved problems, which the State had to tackle on its own. Penderal Moon concluded:

> It soon became apparent that Bahawalpur authorities had been right. The supply of water was found insufficient for the designed capacity of the canals at the Sulemanki and Islam weirs; in particular the shortage at the critical seasons of the year was serious and chronic.[23]

The necessity of augmenting the supply was insisted upon not only by the Bahawalpur State but also by the British districts and the Bikaner State. Hence, to investigate the matters and to suggest the best course of action for the future, the GOI appointed an enquiry committee.[24] The committee verified the cost increases and shortage of supplies in Sutlej Valley Canals.[25] It further proposed to reduce the area for colonization from 2,000,000 to 9,04982 acres. Moreover, a significant part of cultivable commanded area had to be abandoned owing to the shortage of water.[26] The dropped-out area was 700,000 acres, containing the nine miles of Eastern Sadqia Canal and 279 miles of Bahawal Canal. Besides, near completion distributaries, rest houses, residential quarters, and gauge readers had to be abandoned. Even the watercourses as per proposed

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21 Zahid Ali Khalid, "State, Society and Environment in the Ex-State of Bahawalpur: A Case Study of the Sutlej Valley Project, 1921-1947," (PhD Dissertation: University of Sussex, 2017), 112.

22 Barbara Ramusack, *The New Cambridge History of India: The Indian Princes and their States*, Vol. III-6 (Cambridge: Cambridge University Press, 2008), 190.

23 Penderal Moon, *Divide and Quit* (London: Chatto and Windus, 1961), 199.

24 This committee consisted of Sir Barnard Darley (Chairman), Chief Engineer of UP; B. H. Dobsen (Advisor), Commissioner of Punjab and W. Roberts (Advisor), Representative for India.

25 Report of Inquiry Committee, 25.

26 "Administration Report of the Bahawalpur State 1930-31," (Unpublished), 4.

chakbandi plan that were dug for the allotment were of no use.[27] All these expenditures on abandoned areas afforded a loss of 17087543 rupees including interest.[28]

In fact, the Bahawalpur State was eager to benefit from weir control irrigation following the example of the Punjab. No doubts, it gained benefits but at a heavy cost. For instance, during the nine out of ten years in the period from 1930 to 1940, the State canals from Sulemanki and Islam weir, faced heavy shortage of water that was significantly less than what had been envisaged in the plan.[29] The shortage in water supply created a gloomy prospect and shrank the area mainly under cotton and sugarcane cultivation. The decreased production of these crops reduced the State income that was expected to be received from revenue and water rates. However, Punjnad weir was more secure as it was situated below the junction of Sutlej and Chenab. There was generally sufficient water for the designed capacity of the canals. In addition, the paucity of irrigation water caused the land prices to fall.[30]

The arrival of millions of colonists in the State colony areas might also have created the food security problem if it were not for the sufficient production of grains in the old propriety area and its transparent distribution in the colony area. Meanwhile, to redistribute the waters of Indus and its tributaries, the GOI in 1935 appointed a 'Committee of Central Board of Irrigation' under the Chief Engineer of UP Mr. Frederick Anderson. The Committee's recommendations on *Thal* project were in favour of Sindh. With regard to the Bahawalpur State, its recommendations were not encouraging. The area commanded for the State was further

27 "Hakra Project, (proposed re-colonization of the abandoned area on Hakra right and Hakra left distributaries of hakra branch, Eastern Sadqia Canal)", (unpublished) 1. File No. 28-129, dated 16-1-1950.

28 Sutlej Valley Project Case 1946, Bahawalpur Darbar Secretariat, Office of the Prime Minister Bahawalpur State, 7. File No. 18-2, (1946).

29 The Government of Bahawalpur, *A Note on the Claims of Bahawalpur State submitted to H.E. Crown Representatives 1941* (1941), 13.

30 Administration Report of the Bahawalpur State 1942-43, 65.

reduced to 8.50 lacs acres under perennial category and to 17.76 lacs acres non-perennial category. The State's share in the water supply was reduced from 57 percent to 49 percent in *Rabi* Season and 42.2 percent to 37 percent in *Kharif* Season. In addition, the supply volume was also dropped from 15049 to 13034 cusecs.[31] Finally, the total area to be irrigated was 5,108,000, of which 2,825,000 acres belonged to the Bahawalpur State, 1,942000 acres in the Punjab, and 341009 acres in the Bikaner State.[32]

Loan Dilemma: Price for Blessing

The loan dilemma was the atrocious aspect of the plan because the State sources were unable to finance 63 percent increase in cost whereas the original plan did not make any provision for this sort of financial burden. Thus, the State had to incur 14 crore rupees out of a total of 33.31 crores. To finance this additional un-envisaged burden, the State paid 1½ crore rupees from its treasury, used proceeds of two crores from the sale of more land and for the rest a commitment for annual installments was scheduled. But the sale was restricted by the GOP until the sale process would start in the British districts of Punjab because the sale of land in the Bahawalpur State might affect the market and the prices in Punjab.[33] It was an ironic expression of imperialism that when all arrangements for auction of land had been completed by spending large amount, the GOP froze the process. For this reason and owing to the overall impact of the world crises, the amount could not be realized.

Without economic appendage of British, it was impossible to finance the project. Ultimately, the State had to take a loan of 50 lacs from the GOP with six percent interest. Later on, it had to further borrow round to 124 million rupees from the GOI, out of which, 98 million was the principal amount and

31 *A Note on the Claims of Bahawalpur*, 12.

32 The Government of Bahawalpur, *Information and Publicity Department, Bahawalpur State: 1949-50* (Bahawalpur: 1950), 22.

33 The Government of Bahawalpur, *Bahawalpur State: 1949-50*, 7.

25 million was the interest.[34] In lieu of this debt, the GOP held control over revenue, finance and colonization departments of the State. This indebtedness created a serious financial crisis for a number of years. It was a 50-year financing loan, scheduled in annual installments until March 1986. Due to these heavy installments loaded with compound interest rate, the State was unable to undertake any other development schemes or nation building programs. [35] Above all, the crushing burden of interest charges made it impossible for the project to be remunerative for many years to come.

Water Discourse and Role of Custodian Government in the Bahawalpur State

The crux of this whole affair was that the introduction of weir control irrigation was an entirely new discipline not only for the State but also for the whole of India and mistakes were made at the planning stages. Accordingly, subsequent years kept experiencing significant shortfalls between estimates and actual positions.

The GOI was the originator of this project and Foreign and Political Department (through its Resolution No. 1894-1A, dated August 27, 1917) authorized it. The same department was acting as a trustee and custodian of the rights, interests and traditions of native states during a minority administration. This situation put the GOI in a position to exercise its power as the regent/protector of the minor Prince. However, in imposing rigorous terms and compound interest rate for the loan, its role was more of a creditor.

Nevertheless, the despotic role of the British cannot be overlooked. When the Bahawalpur State, which helped the British to promote the latter's imperial interests, took a stand with the British government just to secure the benevolence of its people, it was treated just like another ordinary subject

34 Sutlej Valley Project Case 1946, 1-2.

35 Note on the Financial Position of the State and Working of the 1936, Repayment of Government of India Loan, 2. File No. 19-35, (1936).

of the British Empire.[36] For instance, the construction of the all three weirs was beyond the ambit of the State. As both weirs i.e., Sulemanki and Islam were constructed in the adjacent British districts at Sulemanki village and at Jamlera village some 65 miles below the Sulemanki.

The Punjnad weir was also constructed outside the State in the Alipur *tehsil* of Muzaffar Garh district of Punjab. This was an evidence of imperial control over the waters of the State that if any act of reluctance occurred in future on the part of the Bahawalpur State, it could be deprived of water. The control over water in the State witnessed the imperial despotism, which manifested itself in naked form during the process of loan dilemma of the Bahawalpur State.

The despotic power, in this regard, had no concern as to how and where from a native state would manage the finances imposed on it. The magnitude of the loan crises was much more than the capacity of a small Princely State and it became the victim of imperialism at the cost of perennial irrigation. This agreement essentially pledged the State, to the British. The strong desire for the restoration of its sovereignty as early as possible underpinned the instances of the Bahawalpur *Darbar*. The situation was a challenge and the State responded to it courageously and successfully.

Therefore, the first priority of the State was to liquidate the loan as early as possible. In this regard, some emergency steps were taken to overcome the constrains to the arrangement of finances needed for liquidation. These were: launching a National Saving Scheme that brought ten million rupees; and setting up a Trust Fund. The national saving officers under the Revenue Minister were given the responsibility to advertise the purpose of these schemes to square off the debt. In both schemes, three percent interest was to be given on the amount invested. Further, Rs. 1550000 was borrowed from other indigenous sources.

36 *A Note on the Claims of Bahawalpur*, 5, 16.

Besides, colonists were offered to get ownership rights by paying actual payment at once and without interest. The culmination of these measures was that within 11 years, the State had been able to pay the amount it owed to GOI; almost 40 years before its due time.[37]

Impact of the Project

With the passage of time, the difficulties were subdued and the project turned out to be a blessing in disguise during the following years. In fact, it was a matter of great prestige for the State to be the sole owner of one of the greatest irrigation schemes in the subcontinent and the second largest barrage of the world at the time.[38] Actually, canal based irrigation system was an overwhelmingly positive contribution towards agricultural development and an exhibit of human ingenuity harnessing a natural resource to increase the State's revenue and expanding the agriculture sector for the ultimate welfare of its subjects.

All naturally inundating tributaries and waterways of the State had been replaced by perennial and non-perennial canals by 1930.[39] Using hydraulic engineering techniques to harness a natural water resource, the State successfully overcame the uncertain water supply and saved the region from the danger of floods, particularly the Punjnad Valley. The project proved to be a triumph of British scientific irrigation over the native cultivator's techniques.

In the Bahawalpur State, Sutlej valley canals had converted the extensive sandy tracts into fertile cultivable lands. The length of the canals also extended from 810 miles to 4000 miles. At the time of independence, the State inherited a development-oriented administrative and economic structure. This large-scale work was indirectly connected

37 "Repayment of Sutlej Valley Project Debt, Bahawalpur Darbar Secretariat" (unpublished). File No. 98-193, (1948).

38 Bernard Darley, *The Development of Irrigation in India*, 41.

39 Government of Bahawalpur, "Report on Irrigation 1929-30" (Unpublished), 1.

with the modernization in irrigation sector worldwide. All the machinery and equipment were imported from Europe under the supervision of the British engineers and technicians. As David Gilmartin elicits that the hydraulics of the canal system and mechanics of the dam construction in India were the same as it were used in the western world or in the Indus basin.[40]

However, irrigation extension had its cost too. The canals developed seepage and with the passage of time resulted in the rise of water levels, which led to water logging and salinity. These developments coupled with the most serious challenge to the productive land under canal based irrigation in Punjab further worsened the problem. This overburdened the management of the drainage schemes. Therefore, Dr. Whitecombe labeled the canal system a 'costly experiment'.[41] In old proprietary areas of the State, which were already under intensive irrigation, excessive moisture caused a great deal of water logging, which rendered a great proportion of land uncultivable. The reclamations of such land would take a period from 2 to 4 years to be productive.[42]

Conclusion

All inundation canals in the Bahawalpur State were seasonal. This seasonality meant excess in one season and shortage in the other. The early Nawab rulers could not extend the cultivable area of their State because of less population and inadequate facilities for irrigation. However, their initial canal work formed the basis of new work under Agency, which as compared to the grandiose schemes by

40 David Gilmartin, "Scientific Empire and Imperial Science: Colonialism and Irrigation Technology in the Indus Basin," *The Journal of South Asian Studies,* 53, No. 4 (November, 1994): 1136.

41 Elizabeth Whitecmbe, *Agrarian Conditions in Northern India, the United Provinces under British Rule*: 1860-1900 (Berkeley: University of California Press, 1972), 91.

42 "Post War Reconstruction, Public Works Post War Proposals: Land Drainage and Reclamation in Bahawalpur State" (unpublished). File No. 9-36, (1946).

the British Agency was very nominal. With the help of advanced technology, the British changed the landscape of the State. However, mistakes in the project cost estimation brought a setback to the finances of the State and debt was the key issue in wrecking the perennial irrigation. Some of the difficulties by the SVP were obvious, however, from a long-term perspective, the project became a locomotive for socio-economic development of the arid areas of the State. This project optimized irrigation water availability to a vast area, reduced wastage and enlarged the cultivated area. The transformation of barren tracts into populated region for commercialized agricultural production was the most fruitful result of this project.