Waterscapes and Statecraft: Environmental Transformation, Floods, and Hydraulic Engineering in Early 20th-Century Kashmir (1901–1931)

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Abstract

The valley of Kashmir is an area of moderate rainfall through which rivers flowing down from the Himalayas have been frequently overflowing and changing their beds in the soft alluvial soil. Floods have, therefore, been a recurring phenomenon, caused by snow-melting and heavy rainfall. The present article is an intensive study of the floods that ravaged the valley in a period of over 30 years (1901–1931) during which the ground surface changed with the building of embanked roads, other embankments, and dams, thereby blocking the natural drainage lines of the past. The article also chronicles how the local populations suffered from the constant recurrence and increasing virulence of floods. It thus aims to bring together the information we have on the environmental and human history of the region for a period of about 30 years of Dogra rule.

Keywords: Floods, Embankments, Population, State, Hydraulic Engineering, Kashmir

Introduction

Flood is a hydrological event characterized by high discharges and/or water levels that can lead to the inundation of land adjacent to streams, rivers, lakes, wetlands, and other water bodies. [1] Floods, as defined by the International Commission on Irrigation and Drainage, represent a relatively high flow or stage in a river markedly higher than the usual, which also includes the resultant inundation of lowlands. Since the dawn of civilization, destructive floods have jeopardized settlements located in river valleys and floodplains. [2] Throughout the history of mankind, floods have brought tremendous wealth and prosperity to civilizations, and yet at the same time, they have caused huge losses and resulted in untold suffering for millions of people.

[1] Bradford, Merlene and R. Carmichal., *Natural Disaster*, Vol. II, Saleem Press inc, California, 2001, P. 456.
[2] See A. Wingate, Preliminary Report on settlement operations in Kashmir and Jammu, Lahore: W. Ball & Company, 1888, p. 27.

Historical sources are replete with references that not only show the damage caused by floods but clearly chronicle how people lived with these inundations in the past. During ancient and medieval times, floods were considered the wrath of God and were believed impossible to tackle or control in any way. This perception of floods as an unalterable natural process helped people adapt and coexist with them. Consequently, populations developed agriculture far away from areas that typically submerged during moderate rainfall. Vast barren tracts of land were viewed by Europeans as one of the reasons for low agricultural output in Kashmir.

While floods were a major concern for the state, European experts insisted that investing in flood management would not only tackle immediate consequences but also bring more land under cultivation, thereby raising crop yields. This dual objective of flood management led the state to initiate formal hydraulic interventions around 1898.[3] The period between 1900 and 1930 marks an important landmark in the history of Kashmir as the state undertook systematic initiatives to develop the regional economy, viewing annual floods as the primary obstacle to growth. Prime importance was given to agriculture, which suffered heaviest during inundations while vast tracts remained unfit for cultivation due to waterlogging. Successful flood operations were thus deemed a prerequisite for agricultural development in the valley. [4] According to Major A. de Lotbinière, flood management would protect crops and bring new land under cultivation.[5] Prompted by these goals, the state launched extensive dredging and flood spill channel programs in 1901.

The Cataclysm of 1903 and Early State Interventions

Before major engineering initiatives could take root, the valley witnessed one of its most devastating floods in 1903. Continuous rainfall from July 1 to July 6 recharged the groundwater table.[6] While the initial two days of precipitation were welcomed by peasants as beneficial for paddy crops, the unabated downpour soon generated widespread panic, transforming cultivated fields into expansive water bodies. High discharge levels breached the left bank of the Jhelum River at multiple locations from Khanabal to Srinagar. Although people managed to safeguard movable property based on early warnings, water levels only began receding after rains ceased on July 11. [7]

A brief respite was shattered when heavy rains resumed between July 21 and July 23, creating an unseasonal summer flood.[8] The Jhelum reached a ferocious peak, turning the entire valley into a vast expanse of water where "all distinctions of banks and lands were completely obliterated". Because local swamps were already saturated, floodwaters reached Srinagar from Khanabal in a mere 22 hours.[9] Total catastrophe was partially averted by the strategic bursting of the Dal Lake gates; filling the lake took three to four days, acting as a vital safety valve that saved the city. [10]

Although no human lives were lost, the agricultural toll was immense, destroying roughly one-sixth of the total cropped area alongside heavy damage to Dal Lake vegetable gardens. Eighty-three villages suffered crop losses—26 losing their entire kharif harvest—while 421 houses were destroyed and 625 cattle

[3] See Purva, Hydraulic Problems in Kashmir, 1918, State Archives Jammu, p. 22.
[4] Ibid.
[5] K&K, Wullar Barrage Report, File no. 30. State Archives Jammu. 1900
[6] J.S. Dev, Natural Calamities of Jammu and Kashmir, (New Delhi: Ariana Publishing House, 1983)p. 27.
[7] Ibid.
[8] Ibid.
[9] Ibid.
[10] State Archives Repository, Jammu File No. 163 of 1904, p. 27.

perished. Horticultural sectors lost large numbers of young plants, and essential commodity prices skyrocketed, with city dwellers paying three to four times the normal rates for cereals.[11]

Officially described as "the highest and the most disastrous in its consequences of which any record exists or which living memory can recall," the 1903 disaster prompted the state to maintain comprehensive records. Divisional Engineer Sardar Ganda Singh compiled critical hydrological data, documenting ordinary water levels and peak flood marks at Khanabal, Munshibagh, Shergarhi, Sopore, and Baramulla.[12] Following this disaster, British Resident Sir Louis Dane instituted long-term protection measures, detailing State Engineer Mr. Field and Electrical Engineer Major A. de Lotbinière to draft a comprehensive scheme. After months of surveying, their core recommendations included:[13]

a) Dredging the riverbed from Wular Lake to Baramulla using electric-powered dredgers generated at the Mohra power station.
b) Digging a flood spill channel from above Srinagar to a point 15 miles downstream to divert heavy discharges and safeguard the city.

The spill channel proposal—initially suggested by Walter Lawrence—faced historical obstacles due to the Doodhganga Nallah[14], which flowed in the same direction and suffered from a higher riverbed level and severe siltation. Resolving this required diverting or extensively dredging the Doodhganga. Maharaja Pratap Singh immediately employed foreign experts like Major de Lotbinière and Major H.A.D. Fraser to construct a series of Flood Spill Channels (FSC) running from Padshahibagh through Batamalun Nambal, Hokersar, and Mirgund Nambal to Tengpore. Originally 6 kilometers long, originating at Padshahibagh and discharging into the Hokersar marshlands, these channels diverted roughly 11,000 cusecs of water. The efficacy of this engineering feat became apparent during the 1905 floods, when Srinagar suffered zero damage.[15]

In 1907, the state executed a second major intervention: diverting the Doodhganga Nallah into Batamalun Nambal. Previously, this nallah flowed past the Chattabal cremation ground to join the Jhelum, regularly inundating the northwestern parts of Srinagar.[16] Diversion relieved chronic pressure on the Jhelum embankments, while enabling the state to scientifically reclaim vast tracts of land in Batamalun and Bemina for paddy and maize cultivation. Similarly, following successful dredging operations that lowered Wular Lake's surface levels in 1912, swampy areas between Shahgund and Sumbal were reclaimed into rich maize and pasture lands.[17]

[11] JK. Pol. File 327/1908/ State Archives Jammu.
[12] Bamzai, P.N.K., *Cultural and political history of Kashmir*. Vol 3, Gulshan books, Srinagar, 2007, P. 114.
[13] Ibid. File. No. 163 of 1904, pp.28-30

[14] Lawrence, *The Valley of Kashmir,* Chinar Book Publishing House: Mirpur, 1992, p. 205.
[15] State Archives Repository, File No. 267 of 1907, State Archives Jammu, p. 17
[16] JK, Flood Report, 1909, State Archives Srinagar.
[17] Jammu and Kashmir Administrative Report of the year 1913-14 (s.1969-1970). P. 73.

Recurrent Floods and Evolving Expert Commissions (1909–1928)

Despite these infrastructural safeguards, floods remained a recurring hazard. The summer floods of 1909 resulted in heavy crop damages requiring government revenue remissions amounting to Rs. 69,765 out of estimated total losses of Rs. 98,393.[18] The May 1912 floods were similarly mitigated by the spill channel, though numerous bridges between Baramulla and Chakoti were washed away, and 21 lives were lost.[19]

To counter these persistent threats, subsequent hydraulic experts—including Mr. Purves, Mr. Harris, and Mr. Uppal—were invited to draft long-term regional plans.[20] Mr. Purves proposed partially diverting the Jhelum River at Gagrazu into Anchar Lake, rejoining the main river at Shadipora. However, financial constraints stalled execution. Following the floods of 1919, Lala Tulsi Das revived similar proposals, advocating for a cut from Gagrazoo to Anchar Lake to relieve outfall congestion from the spill channel, reclaim Anchar and Shalbugh swamps, and divert the Pohru Nallah into the Khawajabagh area to minimize silt accumulation in Wular Lake.[21]

The fragile balance collapsed during the severe floods of 1928 and 1929, which abruptly halted pending protective works as funds were diverted toward emergency relief and recovery.[22] The human and economic toll of the 1928–29 floods was documented as follows:

1.	Loss of life	The total casulities in the valley was 76.
2.	Loss of live stock	2228 head of cattle (including sheep and goat)
3.	Loss of state on roads, buildings, bridges etc.	Irrigation head works were damaged or washed away and 76 roads (289 miles in length) and 249 bridges alone suffering to the extent of Rs. 1, 22,000.
4.	Loss of crops and despoliation of land.	The total cultivated areas affected by the floods were 59,125 acres, out of which 39,360 acres were only damaged. Baramulla (mainly around Wullar lake villages) and kulgam suffered the most.

Source: Jammu and Kashmir Flood Report (1928–1929)

Debates on Wetland Ecology and the Harris Scheme

In response to the 1928 catastrophe, the cabinet convened a high-level memorandum review on October 19, consulting chief engineers, the Governor of Kashmir, agricultural representatives from Wular, and veteran administrators. Recommendations included removing the bund below the Sopore Bridge to widen the outfall, conducting longitudinal profiling of the Jhelum from Khanabal to Wular to clear obstructions, and investigating straight river cuts near Khomina and Visipura.[23]

[18] Ibid.
[19] Ibid.
[20] Anonymous, *Jhelum and Tawi Flood Recovery Project,* part A Task Report, Vol I, prepared by EPITSA, 2018, p. 10.
[21] H.L. Uppal, *Flood Control, Drainage and Reclamation in Kashmir Valley,* (New Delhi: Central Water and Power Commission, 1956), pp. 108-111.
[22] Ibid.
[23] Archival Repository Reports, National Archives of India, New Delhi, File. No.178/9-24, 1929.

Dissatisfied with halting progress, the Maharaja engaged Mr. D.G. Harris, consulting engineer to the Government of India. Harris recognized the critical ecological role of natural wetlands and marshes in absorbing major floods. His comprehensive scheme recommended:[24]

a) Raising Jhelum bunds between Srinagar and Khanabal by 3 to 4 feet above maximum flood levels, incorporating escapes capable of discharging 44,000 cusecs into the valley.
b) Retaining the Sopore bar, suspending outfall dredging, and diverting the Pohru River.
c) Reopening old channels from Shadipora and Asham to Ningil and Mujgund to enhance Wular's discharge capacity.[25]

Harris's vision met stiff resistance from local landlords holding lands around Wular Lake reclaimed during Maharaja Pratap Singh's tenure. These landowners favored continuous dredging from Sangam to Wular rather than reopening nallahs, calculating that deliberate seasonal floods would deposit nutrient-rich silt, elevate low-lying fields, and enrich soil fertility. Conversely, Harris refused to commit without dependable, long-term hydrological data, leading to a policy deadlock compounded by state financial crises.[26]

A subsequent conference at Rajgarh on October 16, 1928—featuring prominent figures like Sir Albion Banerji, Guru Janak Singh, G.E.C. Wakefield, and Lala Tulsi Ram—prioritized reconstructing the Munshibagh, Dal, and Gow Kadel gates on modern principles, remodeling the spill channel head tangentially, and constructing a new spill channel length from Kandizal near Pampore.[27]

By 1931, the state formulated a definitive long-term policy under Mr. Harris, who advocated utilizing low-lying 'numbals' (wetlands) as dedicated flood absorption basins by channeling excess waters into Hokersar and Anchar lakes, alongside a 16,500-cusec rock cut through the Doodhganga ridge connecting upper Srinagar to Batamaloo Nambal.[28] Although the government sanctioned Rs. 18 lakhs for the initiative, the project was ultimately shelved.[29] The valley escaped major flood emergencies in the immediate years following, while the global economic shock of the Great Depression of 1929 and the onset of World War II precipitated a steep fall in food prices, forcing the state to redirect scarce resources toward fiscal survival.[30]

Conclusion

Throughout the early twentieth century, the Dogra state viewed recurrent floods primarily as economic bottlenecks impeding agricultural expansion. By co-opting European engineering expertise and deploying advanced machinery, the administration achieved notable success in mitigating urban inundations through innovative infrastructure like the Flood Spill Channels and the diversion of the Doodhganga Nallah. However, tensions between hydraulic stabilization, agrarian demands for nutrient-bearing silt, and macroeconomic shocks—such as the Great Depression—revealed the complex limits of colonial and princely environmental engineering in managing Kashmir's dynamic hydrological landscape.

[24] The Jammu and Kashmir flood report of year sambat 1985. P23.

[25] Ibid. p. 24
[26] Raza Moonis, et al., *The Valley of Kashmir- The land,* vol I, Op cit, P. 138.
[27] State archives repository reports file no 659 of sambat 1984-85
[28] Khan, Gh. Hassan., *irrigation, floods and food problems of the Jammu and Kashmir state*. Op cit, P. 153.
[29] Ibid
[30] *Flood Report of Jammu and Kashmir of year 1928,* Srinagar Archives Srinagar, p. 23-24.