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## **Unseen Side of Colonization of Irrigation Infrastructure in India: A Case Study on Embankments and Canals in Colonial Odisha 1880-1900**

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**Abstract:**

*Irrigation, alike other assets, is often considered one of the most important agricultural infrastructure in India due to its agro-based economic development. Colonization of Indian subcontinent and of Odisha as its integral part had its own legacy on the irrigation system showing relatively backward and underdeveloped. Therefore this paper makes an earnest effort to examine the colonial experience of Odisha with the effect of canal scheme of 1860s. This paper argues that the imperatives of colonial administration as well as its exploitative rule changed the very notion of the benevolence by altering the physical nature and behavior of the floods in the delta. It also examines how the alteration of floods from a beneficial relationship with the Odia cultivators to a natural calamity was effected through a series of engineers' works like embankments and the canal scheme of 1860s. In addition, it tries to highlight the overall water management mechanism in coastal districts of Odisha during the colonial period.*

**Keywords:** *Embankments, Canal, Cultivators, Irrigation, Flood*

### **1. Introduction**

Colonial expansion in India, according to Karl Marx, produced both destructive as well as regenerative forces leading to a radical and fundamental transformation of Indian economy. Side by side commercialization of agriculture, changes in land ownership and above all cropping pattern, the colonial government, too tried to change the age-old feudalistic basis of agricultural infrastructure with the march of time. Of all those activities, irrigation stood prominent.

Emerging new historical discourses have provided a relatively new approach to agrarian history in the recent times. Given the all Indian scenario, Odisha is an agricultural state with more than 70% population depending on agriculture. For irrigation purposes, during colonial period, the people used both conventional and artificial irrigation from several sources such as large river embankments, sluices from rivers by means of water lift by damming up natural streams from tanks, natural springs and wells. So this paper attempts to focus on the above irrigation systems which had been used by farmers in Odisha during colonial period.

Colonial government, as everybody knows, was least concerned about agrarian development of India in any spectacular way due to its exploitative mentality. The measures it had taken to improve the agricultural productivity and production were of colonial design. Embankments, being one such measure in that direction, were constructed to protect the state from inundation and famines. The British government had no systematic policy for embankments. Local zamindars had constructed some embankments, which had been taken up by the British government and carried on by the government officers viz., A.C. Cotton, Colonel Rundall, Capt. Beadle, Lt. Harris and Prof. P.C. Moholanabis. Irrigation provides safety from drought but embankment affords more security from floods than famines. In 1813 a surveyor of embankments was also appointed to survey for the progress of the works of different flood banks. But till 1827 no serious attempt was made to keep the existing embankments in good working order. In 1831 embankments were brought under the charge of public works department. It is evident that there was no regular system of protective works or any attempts were done to repair the embankments already in existence. Embankments in the Odisha delta existed much prior to the colonial conquest. Hunter described them as a "great mounds of earth which were constructed along the margins of the deltaic rivers". According to R.D Souza these embankments were built and maintained by the village communities through a communal system of labour.<sup>i</sup>

In course of time, many acts and reports came into existence for preventing flood and inundation in Odisha. However, in 1855 the Government of Bengal passed Act XXXII of 1855 to protect the embankments. But it failed to meet its aforesaid objectives. Capt. Beadle in 1860 observed that, in Odisha embankments were used primarily for rather than for shutting out flood spill, secondly given then facts the deltaic tracts of Bengal and Odisha. The British administration poorly patronized the construction of embankments for irrigation. Their existence can only be explained as being the product of the initiative of the cultivators, who all in probability. Fortunately, after the devastating flood and the famine of 1866-67 drew the attention to the question of necessity of the embankment. A committee came into the conclusion that the government might safely spend Rs 79, 99,890, Rs 30, 95,770 and Rs 23, 38,970 for effective protection embankments of the District of Puri, Cuttack and Balasore respectively.<sup>ii</sup> As a result of that recommendation,

these embankments were somehow repaired and strengthened without any scientific knowhow. The expenditure however proposed thereon by the inundation committee was not sectioned, as the government was of the opinion that the exchequer of Indian Empire should not be expanded, but latter on agreed this proposal. After the high flood of 1872, a proposal was submitted at the cost of Rs 45, 00,000 for the construction of embankments on the Mahanadi.<sup>iii</sup> Again a proposal was made in 1882 to repair the existing embankments on the rivers Kuakhai, Daya and Branches of Mahanadi which were also overlooked. The government turned down the proposals on the pretext of impracticable financial resources. In 1872, 1879, 1881, 1892, 1895 and in 1896 high floods inundated the area causing injury to the life, property and agricultural products of the state.<sup>iv</sup> In 1885, there were no less than 89 breaches and in 1896 considerable areas of Cuttack and Puri District were remained under water for a long duration.

In the year of 1897 settlement, there were 804 ½ miles of protective works either fully or partially under the government management. Out of that 507 ½ miles of embankments were irrigated 67617 acres were classified as the embankments associated with agricultural work and the rest 294 miles of embankments were connected with protective system. Though the return from these embankments was not encouraging, the government had to spend about Rs 90,000 per annum for its protection and maintenance.<sup>v</sup> These amounts had been spent on embankments since the year of Odisha famine. The average annual expenditure on embankments in the province in the year of 1877-86 to 1887-96 was Rs 102, 713. The average expenditure for whole province on agricultural embankments from 1878-79 to 1897-98 was Rs 1, 04,600.<sup>vi</sup> Towards the end of 1900, there were 969 miles of embankments in Cuttack 84 miles in Balasore and 257 miles in Puri district.<sup>vii</sup> A.S. Thompson's report on the Odisha rivers (1905) stated that in Cuttack, Puri and Balasore districts there were 1290 km long embankments (Classes , I, II) which protected 5280 square km area. There were 67,713 sluices in these embankments.<sup>viii</sup>

## 2. Embankments Rate and the Aul Dispute

In 1876, a dispute arose between the raja of Aul and the government. The Raja of Aul gave tough opposition in 1881 when the governments of Bengal asked about the commissioners of Odisha to notify the raja to remit the government's share of maintenance cost (Rs.24841) of Aul embankment. But in the year of 1886 the court of law gave verdict in the favor of the Raja of Aul. This decision however did not end the dispute which continued for almost 12 years.<sup>ix</sup> So it clearly substantiated that how the British government tried to impose heavy tax on the Aul raja for the benefit of the company. Thus the colonial administration tried to transfer the cost of the embankments systems directly to the *zaminidars* and innumerable tenure-holders.

## 3. Outline of the Canal System

The canals derived their water supply from the rivers and their distributaries. There were many channels which were cut from the main channels to sub-canals for irrigating the interior fields. Irrigation from natural sources was the most important comprising about 70 percent of the whole irrigated lands. For the improvement of agriculture, the peasants of Odisha were acquainted with the use of artificial and temporary irrigation depending on the source of river water *Jheel, Nalas, Tendax* and other water reservoirs before the construction of different canals following the years of Odisha famine.

## 4. Colonel Cotton's Report

Colonel Arthur Cotton was a British general and Irrigation engineer who interviewed with several experienced and knowledgeable members of the administration like Mr. Schalch of the collector of Cuttack, Mr. Taylor, and Mr. Henry Rickets etc. He further studied reports on the rivers prepared by Lieut Harris.<sup>xi</sup> His innovative suggestions for the construction of an elaborate system of canals were a remedial measure against the drought and floods. Arthur Cotton advocated that is not a single area of land in Bengal in all India, or in the world that would not be more productive if it were irrigated at one time and drained at another.<sup>xii</sup> Thus, Cotton suggested a series of engineering works i.e, (a) Weirs across the Mahanadi, Brahmani and Baitarani. (b) Irrigating channels completed for navigation throughout the whole delta tract. (c) Drainage channels between all the Irrigating channels (d) Embankments to all the rivers. (e) A high channel to Calcutta which would also irrigate extensively.

Arthur Cotton's scheme was based on the experience of reconstruction of the ground Anicut at Trichinopoly in 1836-38. Highlighting the objectives, he categorically explained the scheme not merely a protective step to preserve Cuttack town but to perverse the district of Cuttack and Puri. On execution of this scheme an area of 2.25 million acres might come under irrigation along with the opening of navigation between Cuttack and Calcutta. The East India Irrigation and Canal Company was registered in Britain in 1860, and incorporated by an Act of Parliament in 1861 with an authorized capital of £ 2. million for the Odisha undertaking.<sup>xiii</sup> Further the company was guaranteed interest at 5 percent for the capital out lay and government reserved the right to control over all the proceedings of the company relating to returns at last construction work started in 1863, and water was available for irrigation in 1865. On April 1866, the finest irrigation lease was signed for an area of 3.5 acres 1.3 ½.

In 1869-70 only 1729 acres of land were under irrigation which increased to 22,128 acres in 1870-71. The company had the original estimate to irrigate more than 2 million acres of land yielding as estimated profit annually between 9 and 12 percent, with additional receipts from navigation. But Odisha projects never became profitable like works of Godavari delta. The feeling on insecurity of tenant's high rents and revenue and fear of enhancement of rent etc. made the projects costlier. To make it remunerative the water rate from 1-8 *annas* increased to 1-12 *annas* in 1903.

By the end of 19<sup>th</sup> century the following canals were used for irrigation and navigation.<sup>xiv</sup>

The Taldanda and Machgaon canals were used for the irrigation of the lands between the Mahanadi and Kathajuri rivers, Like the Kendrapara and Patamundai canals for the irrigation of the area between the Chitarapala and the Birupa. The Gobri Canal was mainly designed to facilitate communication between Cuttack and the port of Chandabali on the Baitarini river. The length of the canal was

15 miles.<sup>xv</sup> The Gobri Extension Canal was connected from the left bank of the Gandakhia River at the village of Iokinathpur to the right bank of the Brahamani river at the short distance below Pattamundai. The depth of water at full supply level was seven feet. It discharged capacity of 648 cubic feet per second it commanded 32,000 acres and was able to supply to 7,600 acres of Utikan pargana.<sup>xvi</sup> The High Level Canal was originally designed to serve the dual purpose of navigable trade route between Cuttack and Calcutta and irrigating the country through which it passed. The total estimate for high level canal was Rs 42, 47,052. It was started from the left flank of the weir across the Birupa. It ran northwards through Cuttack and Balasore districts till it connected Hooghly River at Ulbaria. It had a total distance 230 miles. The great scheme was however abandoned and only three ranges were completed, of which the first and the second covering a distance of 45 ½ miles lied with in Cuttack district.

The range III was in the Balasore district. The Jajpur canal situated at the bifurcation of the river of Baitarini and the Bura rivers; it ran for 6.5 miles towards Jajpur town. It was the youngest member of Odisha Canal system. The works for the Odisha Coast Canal started in the year 1880-1881; it was partially opened for traffic in 1885 and entirely in 1887. The sanctioned estimate amounted to Rs 44, 74 941. Its main purpose is to link in a continuous chain of canals taking off from the Hooghly river below Calcutta, passing through Bengal, Mindanapur district and the whole length of the Cuttack division, ending as far as south as Vishakapatnam in the Madras presidency.<sup>xvii</sup> Though this scheme was never completed in its entirety, two major projects were conducted on its lines. The main cause, which attributed for the construction of the Coast Canal was that as protection against famine and remunerative as a trade route. It hoped that nearly all the import and export trades of Odisha would pass through it, and that it would yield a revenue of over 2 ½ lakhs. But these expectations were not fulfilled, and the canal proved a loss to government after the opening of railway ways in 1896. It remained no longer as a great valuable as a famine protective work. Being the tidal nature of its waters it was of no use for purposes of irrigation and did not benefit agriculture. In October 1899, a new project was started for the proposed canalization of a natural channel known as Dudhai nala, amounting to Rs 85,000. The object of this scheme was to convey water from the Bramhani river to irrigate the spring rice known locally as *dalwa* in the lower part between the Bramhani and Kharsua rivers.

There were 205 miles of canal for irrigation only, besides nearly 1,100 miles of distributaries and village channels. The maximum discharge of the canals was 6058 cubic feet per second and the area commanded was 5, 76,264 acres, although the area actually irrigable in 1905 was 2,1,8,259 acres only. In the end, however these works failed to be directly remunerative. The return to the government on the outlay was only nominal. The total capital cost exclusive of interest in (1900-01) had been Rs. 2, 64, 46,617. The average annual working expenses for the last five years were Rs. 4, 91,830. In 1903-04 the working expenses were not only covered but were an excess of Rs 45, 5310 to be paid towards interest charges. It was however, not due to the increase in gross revenue for it stood at Rs. 4, 27,983 as against Rs. 4,67,913 the average from 1896-97 to 1900-01. But this excess amount was due to the reduction in the working expenses. Extension of canal system was taken up by the British government during the 20<sup>th</sup> century. By the end of 1911, main canals of 326.75 miles and distributaries of 1246.5 miles were placed for supply of water and in 1930 there was an increase of 56 miles in distributaries but the main canals remained the same. At the end of 1932 the total Mileage of canals was as follows: (a) Navigable canals (also used for irrigation) -285 ½ miles; (b) Branch canals (for irrigation only)-122 miles; (c) Distributaries -1382 miles. (d) Village canals -26 miles. The total mileage of canals had not been increased since 1932 but there had been an increase of 26 in the mileage of the distributaries.

When canals became capable of supplying water for irrigation the people were afraid to use the water. Generally, it was assured that lest their lands which might be improved by irrigation would be assessed highly in the forthcoming revision of the settlement in 1867. The rates which were fixed for company's water were based on those obtaining in the Godavari and Krishna deltas. But the tenures in Odisha were essentially different from those of the Madras districts.

## 5. The Water Rate

In 1872, a great deal of discussion ensued regarding the nature of the water-rate. When the Odisha irrigation company first began to offer a supply of water to the cultivation, they demanded a rate of Rs. 5 per acre. The people never knew what the rate would be next, because due to constant changes and fluctuations in the water-rates. The colonial administrations attempts to overcome the crisis created by capitalist property by attempting instead to bound and regular the delta's river system as a commodity through the construction of the Odisha canal scheme of 1863.<sup>xviii</sup> The recovery of water rate act of VI 1869 was passed by the council of Bengal which replaced Act of 1869. Thus management of irrigation and collections of water rate was entrusted to a revenue superintendent of the rank of collectors. In 1876 Irrigation Act was passed by which the rate was fixed at Rs 1-8 per acre for flow irrigation and Rs. 1 per acre for lift, when the whole irrigable area of the rice land of a village was for a term of five years. For leases of a smaller area or for shorter periods, a rate of Rs.3 per acre was required. These rates remained unchanged throughout the latter half of the nineteenth century. In 1898-99 there were only 1,89,866 acres were in comparison to 4,00,000 acres of irrigable area and 21,98,937 acres of net cropped area. That marked little difference during the triennial period at 2,81,802 acres, 4,75,000 acres and 23,50,105 acres respectively.

As a result, a measure for irrigation increased slowly, but on the whole steadily and by 1876-77 there were 30,000 acres in 1889-90. It reached up to 186,627 acres from 1912. The water rate charged for the *kharif* season was Rs. 0-2-0 and in 1922 to 3-8-0. For *dhoya* or water logged lands the rate was lower viz, Rs. 2 in 1922. These rates have been reduced in 1931 to Rs. 3 and Rs.1-12-0 respectively for season lease for *kharif* season was reduced from 4-8-0 to Rs 4-4-0 (Rs. 4 in case of High level canal range III). The same was also applicable for provisional leases.<sup>xix</sup>

## 6. The Owner's Rate

The Owner Rate (OR henceforth) for canal irrigation in colonial India was intimately tied to the land revenue demand. According to the dominant reasoning within the ranks of the colonial officialdom, irrigation inevitably caused is imposed in the water tracts consequently. The OR was imposed on the proprietors of all the estates in which canal water had been introduced after the land settlement had been concluded and it was usually pitched at a third of the water rate. The fixation of water rate became a Gordian knot before the government. In the Odisha delta, the water rate had been virtually frozen at Rs 1-8 per acre for flow and Rs. 1 per acre for lift irrigation.

In November 1884 commissioners were appointed on the matter of assessing and collecting the rates. No definite recommendation was made as to how such illicit irrigation was to be prevented. The central government pushed for further inquiries in 1887 and 1888. The data obtained however, was so confusing that it led the director of land records to exclaim in disgust that it was 'hopeless to obtain correct returns by the agency of the *patwaris* (clerks) and *Kanungoes* (accountants). In January 1897 at a conference in Cuttack the OR was once again comprehensively discussed and instructions for another study were issued. This time even Officer J. E. Webster, were deputed to collect information within a year, covering 320 irrigated and several unirrigated villages. Webster's report, however, once again agreed with the findings of the previous surveys and some of his observations are strikingly instructively. Babu Jamini Mohan Das again conducted a micro-study of the rents in the pargana of Derabasis (Puri districts). Mohan Das's detailed investigation into the matter was concluded on the note intone with the earlier inquires that no evident surplus was ascertainable. Finally, in 1900 the director of the department of land records and agriculture ended the investigations with a categorical declaration that no conclusive evidence was available to warrant the imposition of an owner' rate.

## 7. Conclusion

Though, initially the irrigation system was to protect the people from flood and famine, but later it was diverted for the collecting more revenue from the people. The larger context of the Odisha canal scheme consisted, however in the recovery of agricultural prices that nurtured colonial hopes of augmenting revenue by improving agriculture in the search of British capital for secure investment opportunities. The company failed to rise from private sources and depended mostly upon government funds and facilities. In contrast, its result 'fell distressingly short of expectations'. The canal scheme not only proved to be a financial failure but also dislocated the Oriya cultivators from their relationship with the ecological settings. Clearly, the colonial administrations inability in the Odisha canal tracts to implement remunerative Water Rate and their repeated failure to arrive at an OR resulted from a far broader crisis than administrative logistical, organizational or technical inadequacies. Two thinks chalk out that firstly, the both zaminidars consistently reported a loss in fertility and a net decline in crops yields in the irrigated tracts. Colonial officials moreover, repeatedly noted that the canals could effectively irrigated only higher lands, while the lower fields were in fact often waterlogged by leakages from the distributaries. Thus the government of British India realized that the investment for irrigation, through the company was the fruitless drain on its resources.

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