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IRRIGATION DEVELOPMENT AND IMPROVEMENT OF GRAND ANICUT UNDER THE SIR ARTHUR COTTON

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Abstract:

Even before India went under the colonial rule of the British, while the East India Company continued to administer the territories in their command, they realised that the restoration and improvements to the existing irrigation works should get the first priority in the civilian rule to keep the farming community in good humor and assist in maintaining food production, incidentally improving their revenue. As early as 1809, engineers under designation of "Superintendents of Tank repairs" were appointed and asked to aid the Collectors. This shows that the minor irrigation tanks occupied prime place among the public works at the time. By 1825, the post of "The Inspector General of Chill Estimates" was created to function in the headquarters under the Board of Revenue and supervise the work of the 'Superintendents of tank Repairs' in the districts. The contribution made by the most illustrious irrigation engineer of the times, Sir Arthur Cotton, has been immense. Ever since he entered service in 1822 as an Assistant to the 'Superintendent of Tank Repairs' he plunged himself heart and soul for the continued development of irrigation benefits to this part of the country. The one ambition he had closest to his heart was to create large reservoirs, dig up a net-work of canals all over on the Indian continent and make them all irrigation cum navigation canals so that the farmers could be offered cheap mode of water transport for marketing their produce. Godavari river was to be the scene of his most toilsome labour and his grandest success was in the planning and construction of the Dowleshwaram ani cut across this majestic river in record time during 184 7 to 1852 and transform the delta into a prosperous tract with numerous canals and distributaries navigable as well. He drew great appreciation from the Governor in Council and the Court of Directors of the East India Company in England. More than that he has left behind a name and fame and is being remembered with great reverence and deified by the local populace to this day. His handling of the Cauvery irrigation was superb. The Celerons arm was scouring itself deeper and the Cauvery was getting silted up.

Key Words: Utilization, Droughts, Contribution & Irrigation Benefits

Introduction:

Soon after the British had succeeded in acquiring large territories through their military action and various other means of gaining supremacy, they started consolidating their holdings and turned attention on administrative measures to aid civilian rule. Fortifications and cantonments while the Board of Revenue had a department called the Mara math Department to look after the irrigation works, navigation canals, all civil buildings, minor roads etc. Initially the Collectors in the districts assumed charge of the public The Engineering Department of the Military Board manned by Royal Engineers looked after the garrisons, all works, irrigation structures with some professional assistant caned this did not function effectively galaxy of British Engineers most of them with the Military Engineering training with the ranking as Reoccupied the post of the Chief Engineer, the notable among them who contributed immensely for the development of irrigation in the state Estocially Sir Arthur cotton contribution and his in evolvement of construction as well as Improvement of grant ancient. He entered service in 1822 as an Assistant to the 'Superintendent of Tank Repair she plunged himself heart and soul for the continued development of irrigation benefits to this part of the country. The one ambition he had closest to his heart was to create large reservoirs, dig up a net-work of canals all over on the Indian continent and make them all irrigation cum navigation canals so that the farmers could be offered cheap mode of water transport for marketing their produce Sir Arthur Cotton next turned his attention to the Grand Anicut structure itself Sir Arthur Cotton after deciding on the construction of the upper Anicut on Coleroon at the Head of the delta, examined the course of the Coleroon downstream and felt there could b~ a case for harnessing the flows entering the Coleroon both at Upper Anicut and also the surpluses joining from the Grand Anicut, a little lower down to improve the withdrawals through the Vadavar and Raj an Channels that were taking off from Coleroon on either bank.

Agrarian Scenario:

The agrarian scenario in this part of the country as in others has been far from satisfactory at the beginning of the 18th century. The irrigation assets created in the medieval times had badly' deteriorated due to long neglect under the later rulers who were more intent on safeguarding their throne from the onslaughts of their enemies than plan for the development and the welfare of their subjects. People were left to the mercies of the rain God and the food production _was low and precarious. There were frequent occurrence of droughts and famines. Major famines in the Madras Presidency are reported to have occurred in 1709-1711, 1728,

1731-1734, 173 7, 1782 and 1792. People were badly impoverished and the village structure, which was mostly self sufficient was broken down. The British Engineers had therefore set their first task on repairs and restoration of old indigenous "irrigation works already in place for better utilisation than think of any new irrigation projects. They were themselves no experienced irrigation engineers for there was hardly any irrigation in their country. Still they ealised that for the stability of their own colonial rule and to ensure peaceful countryside where agriculture is the mainstay, they must tom their attention to irrigation development. But for every scheme they proposed they had to show corresponding revenue in terms of land tax and it was no easy task to satisfy the administrators

Irrigation Development of Conceive and Implement Centered:

- ✓ Repairs and restoration of the minor irrigation tanks, through closing the breaches in the bunds and strengthening, repairing or replacing the sluices and providing adequate spillage structures. These works brought cheer to the farmers who in any case were prepared to take charge of the management of these storages, improve the distribution channels and use the water following their traditional methods of sharing.
- ✓ Desilting and improving the several channels taking off direct from the river systems in the state, to enable them to draw the waters as and when the river flows occur during the monsoon, and carry the same to either feed the Ayacut direct or feed the minor irrigation tanks lying in chain enroute, in whatever way the existing system was designed. Providing control structures was also done wherever feasible and found necessary.
- ✓ Providing weirs or Anicuts across the streams and rivers to ensure better withdrawal through the channels taking off, with adequate command to maintain the designed full supply depths in the channels. In most cases temporary bunds and korumboos made and maintained by the local beneficiaries were replaced by masonry structures with the necessary scouring sluices, head sluices and the apron below the overflowing weirs.
- ✓ Major improvements to the Grand Anicut complex on Cauvery and the development of the Cauvery Delta System feeding the large delta once proclaimed as the 'Granary of the South.

Contribution of Sir Arthur Cotton:

The contribution made by the most illustrious irrigation engineer of the times, Sir Arthur Cotton, has been immense. Ever since he entered service in 1822 as an Assistant to the 'Superintendent of Tank Repairs' he plunged himself heart and soul for the continued development of irrigation benefits to this part of the country. The one ambition he had closest to his heart was to create large reservoirs, dig up a net-work of canals all over on the Indian continent and make them all irrigation cum navigation canals so that the farmers could be offered cheap mode of water transport for marketing their produce. Godavari river was to be the scene of his most toilsome labour and his grandest success was in the planning and construction of the Dowleshwaram Anicut across this majestic river in record time during 184 7 to 1852 and transform the delta into a prosperous tract with numerous canals and distributaries navigable as well. He drew great appreciation from the Governor in Council and the Court of Directors of the East India Company in England. More than that he has left behind a name and fame and is being remembered with great reverence and deified by the local populace to this day. His handling of the Cauvery irrigation was superb. The Coleroon arm was scouring itself deeper and the Cauvery was getting silted up. The silting not only interfered with the passage of low flows but also reduced the carrying capacity of the Cauvery arm with the result that flood levels rose high frequently breaching the low flood banks and inundating and silting the tract.

Sir Arthur Cotton realised that the first responsibility was to ensure adequate flows to the delta and rightly decided to tackle the problem right at the head of the delta where the first split of the Cauvery river occurs. He planned and constructed the Upper Anicut across the Coleroon arm in 1836-38. It was a plain anicut with a body wall and the necessary aprons. Incidentally this was the first large work executed by the British in Tiruchirapalli after they took over the region from the Maratha rule in 1800

Sir Arthur Cotton next turned his attention to the Grand Anicut structure itself. The silting upstream was heavy affecting the flow into the Cauvery and Vennar rivers feeding the delta. He decided that a few scouring sluices introduced in the Anicut structure would relieve this problem and carry the silt into the Coleroon arm through the Ullar. He launched this work in 1839. It was here that he learnt his first lesson of building structures on sandy beds. While opening out the foundations for the scouring sluices on the right end he was inquisitive to see as to how the Grand Anicut which was already in position for over sixteen centuries would have been founded. To his dismay he found that the foundation base was nothing but a mat of cyclopean stones embedded in the native clay perhaps by their shear gravitational weight and stood unmoved and unshaken in fast grip. He is reported to have ordered quick closing of the foundations with concreting for the new addition, lest the foundation of the old structure may get disturbed. He has also recorded later that this experience of his had given him confidence to tackle the foundation for the new Anicuts he had made on the same Cauvery and then River Godavari

Improvement of Grand Anicut:

Since then several improvements were carried out in stages in the Grand Anicut complex which may be recorded here for maintaining continuity of thought and to appreciate how all the time the base structure left by Raja Karikala Chola was kept intact since no one dared to disturb it in the process of modernising. When the bridge was constructed in 1839, the effective length of the Anicut got reduced to 224.0 m (735ft). In 1886, automatic falling shutters 0.86 m (2ft.1 0 in) high, were installed over the crest of the Anicut to provide adequate waterway to discharge the floods. Thirteen years later in 1899 these falling shutters were replaced by lift shutters 9.75 m x 1.52 m (32ft x 5 ft) size designed by Col. Smart and fabricated in the Public Works Workshop in Madras and they stay on till to-day. When a new diversion structure is proposed, the Anicut is first designed and constructed across the river course and along with it, the head regulator for the irrigation channels taking off from the river and the necessary scour vents or alten1ative silt exclusion devices are provided. The Grand Anicut structure is unique in this respect. This however was built on the left bank of the River Cauvery to maintain higher flow levels in Cauvery and spill the surplus into Coleroon. The Cauvery continued to flow into the delta with no regulator to control the discharges. Vennar, the river to the right of Cauvery, had its open off-take about 5 km upstream of the Grand Anicut location.

While the Upper Anicut, the Cauvery dam and the Grand Anicut ensured adequate flows being carried by Cauvery and Vennar for the delta irrigation there was no means of avoiding flood waters rushing into the delta streams in unrestricted large quantities thus creating breaches in the rivers and channels and causing heavy flood damages. For a along time this helpless state of affairs continued. The first proposal for the regulation of floods entering into the delta unchecked were made by Captain Mead in 1870. He suggested regulators being built on Cauvery and also Vennar at the head of the delta close to the Grand Anicut. Major Montgomery who was asked to examine the proposals gave his report in 1881. He made a recommendation which was relevant in the situations then existed and said that the outlets to be built across Cauvery and Vennar should have adequate vent way to pass all the local floods. He rightly felt that each section of the delta should pass its share of the floods minimizing concentration of damages in particular routes. At times of normal flows the regulators would control the distribution of flows between Cauvery and Vennar

The periodical improvements to the Grand Anicut and the several outlets that have been constructed on the Cauvery arm above Grand Anicut have served to safeguard the structure limiting the flood discharges it had to take. Breaches that occurred in August 1909 in the Cauvery bank have, however, been due to leakages that have developed earlier. The failure was not so much due to the incapacity of the Anicut discharge the flood volumes.

Though at times of heavy floods reaching the Anicut, part of the floods were discharged through the Cauvery and Vennar arms through the regulators, care was always taken to see that the difference between the water levels upstream and downstream of these regulators never exceeded 2.75 m (9ft.) which, to a certain extent, restricted their usages for flood discharges. At such critical situations momentarily safety of the-entire complex used to be feared but fortunately nothing untoward has so far happened.

Another major improvement since made is to energize the shutter operation in all the Head Regulators in the complex and the Grand Anicut by providing electric motors. This has eased and quickened the shutter operation remarkably which incidentally ensures uniform opening of the shutters during all stages of water regulation. The old structure thus continuously updated though its existence of eighteen centuries is now conforming to latest hydraulic design and equipped with the modern operational facility Map Now a day's shows the General Plan of the Grand Anicut Complex as it exists today.

Construction of Upper Anicut:

The Construction of Upper Anicut had the effect of diverting into the Cauvery a good deal of flow, which would otherwise have been wasted into Coleroon. But the arrangement did not permit any regulation of water between Coleroon and Cauvery.

As the Aganda Cauvery carries large quantities of sand, the result of construction of solid Anicut across Coleroon was that the Cauvery with its open head took a far larger portion of this heavy sand in high floods. To remedy the situation, the Anicut was remodeled in 1902 under the proposals of Colonel Smart. The crest was cut down and remade to a uniform level of 0.61 m (2 ft) above the zero of Cauvery arm gauge. The Anicut after remodeling consists of 55 bays of 12.20 m (40ft) span each, the shutters being 1.83 m (6ft) high. Besides other advantages, the alterations carried out permitted water to flow in Cauvery arm up to a gauge of 2.44 m(8 ft) before any water is surpluses into Coleroon. This structure is safe to this day and serving its purpose.

After the construction of Upper Anicut, it was found that there was a tendency for the Cauvery bed to scour itself with an undue amount of water flowing down during floods. This often resulted in heavy floods being realised at Grand Anicut. To obviate this difficulty, in 1845, the Cauvery Dam was built across Cauvery at the head of Srirangam island roughly in line with the Upper Anicut on Coleroon. It consists of flooring of 0.91 m (3 ft.) thick, the upper part of which consists of cut stones. The floor rests on a double row of wells 1.37 m (4 ft.) external diameter and 1.83 m (6 ft) deep filled with concrete. The upstream and downstream aprons are of rough stones and 2.74 m (9 ft) and 6.4 m (2 ft.) width respectively. This construction was successful in effecting

a satisfactory and smooth division of flow.

Sir Arthur Cotton after deciding on the construction of the upper Anicut on Coleroon at the Head of the delta, examined the course of the Coleroon downstream and felt there could b a case for harnessing the flows entering the Coleroon both at Upper Anicut and also the surpluses joining from the Grand Anicut, a I little lower down to improve the withdrawals through the Vadavar and Raj an Channels that were taking off from Coleroon on either bank. Vadavar taking off on the left flank was feeding the Veeranarayanan reservoir. Veeranam tank has formed in the first half of 1st century by Paranthaka Chola as mentioned earlier. There were also, the Rajan Channels south and north feeding the command on either flank of the Coleroon in the estuary. From the name we may have to presume that they should be the handiwork of some Chola Raja, who should have thought of extending the benefit of irrigation to the north of the Cauvery old delta. The relative locations of the commands under these channels and the Veeranam tank and its chain tanks of Perumal Eri, Wallajaheri with reference to the spread of the old delta. A note on the Veeranam tank is given at the Cauvery basin.

Sir Arthur Cotton designed an Anicut to be built across Coleroon 154 km (96 miles) below the Upper Anicut and 25 km to the north of the Kumbakonam town to provide the necessary command levels for the channels taking off from the Coleroon perliaps with open heads. He got the work sanctioned lily the government on the 31" July 1835 and executed it in a great incredible speed by 1836. He sank brick masonry wells in the wide sandy bed and erected the body wall with the necessary aprons. The credit goes to the managerial skill of col. Sir Arthur Cotton and the large band of native workmen and mistris' he was able to muster to work with him with the same dedication. But the Lower Coleroon Anicut being the last structure on the river had throughout a chequered history wearing out the fury of the floods. The first breach occurred in November 183 7. Being near the coast, more than the floods that run down the river form upstream, it is the floods caused suddenly by the cyclonic high intensity north-east monsoon rains during the months of October to December that created damages to this structure often. The damages were rectified at a cost of Rs.21, 008/-. In 1854 the Anicut was extended and improved at a cost of Rs. 70,000/- and a bridge was constructed over brick arches at a cost ofRs.30,000/- to prove a means of crossing.

Conclusion:

The Cauvery delta, which has been and would be the largest contiguous patch of irrigation area in the state also received the due attention in improvement and maintenance during the British Rule. The delta is a creation of the natural processes of any river system at its estuary. Cauvery delta served by the several distributaries into which the main river splits itself has been a fertile alluvial plain most suited for rice cultivation and the people living in the delta area have for generations been engaged in irrigated agriculture. Ever since Raja Karikala Chola times (2nd century AD) and possibly several centuries earlier, they have been raising their crop through inundation irrigation and have experienced the good and bad of such a system. The Cauvery at the Grand Anicut sub divides into two main rivers viz. Cauvery and Vennar which sub divide further down as they approach the sea into 21 and 15 rivers respectively to feed the delta though a net work of main channels and numerous branch channels, minors and sub minors. This network of channels must have been created over a long period of time by the rulers and the beneficiary to lead the river water to irrigate their lands. Menu contribution of Sir Arthur cotton, very good effort of future utilization of irrigation facilities.

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