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An Enquiry into the Historical Contribution of Pennycuick for the Irrigation Development in the Madras Presidency, India

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Abstract:
Tamil Nadu' s driest regions lying in the present districts of Ramanathapuram, Tuticorin, Theni and parts of Virudhunagar were one of the worst hit in the series of famines that occured in India around the 1700 ´s. At first, Muthuirullapapillai, Minister of Sethupathi King of Ramanathapuram took the initiative for diverting Periyar River into Vaigai river in 1798. The idea of diverting the Periyar water towards east to Madurai was given a shape in 1808. J.Pennycuick suggested that the proposed dam should be masonry of 155 ft high which was agreed by R. Smith. Colonel Pennycuick became incharge of dam construction and he decided to divert the west-flowing Periyar (river)'s culmination in the Arabian Sea towards the East so that it could irrigate lakhs of acres of dry land depending only on Vaigai river. The project as estimated by Pennycuick was Rs.50,00,000. Finally, an agreement or a lease deed in the name of Secretary of State for India and the Maharaja of Travancore was executed on October 29, 1886 to construct a dam over the Mullaperiyar to deflect its waters to the Madurai district for irrigation and leased out for this purpose 8000 acres of forest land to the government of Madras for a period of 999 years and if necessary, for another 999 years. The agreement on behalf of the Maharaja was signed by his Dewan V. Ramiengar. Formal sanction to the Periyar dam was received in the latter half of 1887 and the preliminary works were commenced in the month of September 1887 with a small establishment. Lord Connemera, the then Governor of Madras formally inaugurated. When the Primary construction work was executed, the dam was washed away by flood water. The British Government gave up the dam construction project due to heavy financial loss. But Penny Cuick did not get disheartened. He went to London and sold his properties. He came back to India to resume the dam construction work with his personal money. With his efforts dam construction was completed in 1895. After the construction of the dam was over, People in the Vaigai basin prospered as their agriculture got boomed.

Tamil Nadu's driest regions lying in the present districts of Ramanathapuram, Tuticorin, Theni and parts of Virudhunagar were one of the worst hit in the series of famines that occured in India around the 1700′s. With a view to address the annual prospect of drought, the then Ramanathapuram Raja got his minister to analyse the feasibility of tapping the perennial Periyar river. The river Periyar, rises in the Sivagiri peak of the Western ghats[i] in the Quilon district 80 km south of Devikulam at an elevation of about 2400 m. and traverses south through the steep cliffs and dense forests for about 16 km, where the tributary Mullaperiyar joins on its right at about an elevation of 850 m. The river then turns west, cuts through the hills in a narrow deep gorge at about 11 km bellow Mullayar junction. It is this gorge which has facilitated the construction of the India's oldest masonry dam creating the well-known Periyar Lake. The river then takes a winding course until it emerges in Vandiperiyar, a town on the Kerala-Tamilnadu border. The Periyar is also known as the Mullaperiyar, after a tributary, the Mullayar, which joins it about 50 km from its origin in the Sivagiri Hill, east of Peermedu. Periyar river is a west-flowing river of Kerala State. The River, having a total length of about 232 km traverses the taluks of Peermedu and Devikulam[ii] in Kottayam District and parts of Ernakulam District. Besides Mullayar, many other tributaries join the main river on either side and of which Kottapanayar on the right, Cheruthoni on the left are important.

River Vaigai is not perennial and is one of the medium size rivers in the country. The basin extending over the districts of Dindugal, Madurai, Theni and Ramanathapuam of Tamilnadu state is 7030 sq km in extent[iii]. Just to the west of Vaigai basin, on the other side of the Western Ghats ridge lies the Periyar basin, draining the largest catchment in the Kerala State. The head reaches of Periyar being in dense forests, inaccessible and uninhabited, and hence there could not have been any possibility of assessing the river flow at any time, not even to measure the rain falling over the catchment. South-west monsoon brings in intense rainfall in this region but water potential that could be harnessed had to be assumed from a measure of rainfall in stations far away from the area of interest. The run off factor could be high with the catchment being heavily covered with vegetation in the steep slopes in high elevation and with less evaporation losses. Even assuming an average rain fall of about 1800 to 2000 mm (70 to 80") and a catchment area about 648 sq.km (250 sq miles) upto the gorge, about 11 km after Mullayar join the river, the early investigators were confident[iv] that the river yield would be substantial and could irrigate large extents of lands in Vaigai valley alone if all that water could be transferred across the ghats to the east. At first, Muthuirullapapillai, Minister of Sethupathi King of Ramanathapuram took the initiative for diverting

Periyar River into Vaigai river in 1798[v]. But this effort of Muthuirullapapillai came to an end with failure. The idea of diverting the Periyar water towards east to Madurai was given a shape in 1808 by the late Sir James Caldwell but was abandoned. The subject was mooted in a desultory manner from time to time and in 1850 a small dam and channel work were actually commenced for diverting a small tributary of Periyar, the Chinna Mullayar, based on the proposal of Captain Faber. But this was also stopped due to various reasons.

The Project proposal was revived by Major Ryves R.E, District Engineer at Madurai, in a practical form. He submitted a detailed proposal for diversion of water in 1867.He proposed an earthen dam 162 ft.high across the river Periyar with an escape to be made at 142 ft. above the river bed to divert the waters into the valley of Vaigai by cutting through the watershed, an open channel with its sill 17 ft. below the escape crest to lead the water to Suruliar Stream, a tributary of River Vaigai. Major Ryves estimated the cost of the project as Rs.17,49,000[vi].

However, the details of the scheme as contemplated by Major Ryves came in for considerable criticism and there was hesitation in accepting the proposal. Further investigations were committed to Mr.R.Smith in 1870.Mr.R.Smith modified the proposal of Major Ryves. He proposed an earthen dam of 175 ft by "silting process", tunnels for river diversion and under watershed ridge for diversion of waters eastward to flow down to Suruliar. The cost of the project was estimated as Rs.53,99,700[vii] exclusive of interest, indirect charges and any payment to the Travancore Government for the use of water.

Mr.Smith's proposal was generally approved. But the then Chief Engineer, General Walker, R.E. was opposed to the idea of building the dam by 'silting process'. The advisability of constructing a masonary instead of a "silt dam" was also mooted. This was a very crucial

decision. At this point, Captain. J.Pennycuick suggested that the proposed dam should be masonry of 155 ft high which was agreed byR. Smith. Colonel Pennycuick became in charge of dam construction and he decided to divert the west-flowing Periyar (river)'s culmination in the Arabian Sea towards the East so that it could irrigate lakhs of acres of dry land depending only on Vaigai river. John Pennycuick was born on January 15, 1841 to Brigadier-General John and Sarah Pennycuick. He was one of five sons and six daughters. The Brigadier-General who had joined the army in 1807 was killed in action in 1849 in the Battle of Chillianwala during the Second Anglo-Sikh War.

John Pennycuick studied at Cheltenham College, then joined the Addiscombe Military College where, in 1858, he was one amongst six cadets who qualified for the Royal Engineers and joined the Corps as a Lieutenant. There is little documentation available in India on how his military career developed, but what is known is that he commanded H Company of Madras Sappers, which was employed in the public works at Zoulla during the Abyssinian campaign in 1868. The official correspondence mentions that Pennycuick "appears to have conducted the duties of his position in an efficient manner." In recognition of his service in Abyssinia, he was awarded a medal. A promotion to the rank of second Captain followed in 1870.

He married Grace Georgiana Chamier in 1879 and the couple had five daughters and a son. The son, also named John Pennycuick, went on to become a Vice-Chancellor of the High Court of Justice of England and Wales. It was Pennycuick's stint with the Public Works Department and his involvement in the Periyar Irrigation Project that was to be his most defining contribution to the Madras Presidency. He held a number of positions in the Department, such as Superintending Engineer in October 1881, Deputy Chief Engineer and Under Secretary to the Government in January 1883, and Superintendent of Works, Tank Maintenance Scheme, in April 1884.

Captain Pennycuick, after working seriously, proposed a masonry dam[viii] section based on Molesworth's formula[ix]. He proposed a composite section of necessary base width, having front and rear faces of solid masonry with longitudinal and cross walls 6ft. thick, the cells formed by these walls being filled with concrete. This was however not favoured for fear of unequal settlement.

The year 1876-77 experienced a severe famine and the matter of Periyar dam was temporarily put aside[x]. No further action of a practical nature was taken during the next six years. However, in the meantime the idea of masonary or concrete dam deepened. Finally, by an order dated 8 May 1882, Major Pennycuick was given[xi] the responsibility of revision of the plans and estimates for the entire project and this officer submitted in the same year a report with detailed estimates which were eventually sanctioned.

His proposals relating to the headworks are as below:[xii]

Height of dam above river bed	47.244 m (155 ft.)
Parapet wall	1.524 m (5 ft. height)
1219 m (4 ft. thick)	
Top width of dam	3.658 m (12 ft.)
Bottom width of dam	35.280 m (115 ft. 9 in.)

He proposed a detailed and meticulous plan for river diversion, construction, power, etc. for carrying out this major work successfully and economically. The project as estimated by Pennycuick was Rs.50,00,000. Finally, an agreement or a lease deed in the name of Secretary of State for India and the Maharaja of Travancore was executed on October 29, 1886 to construct a dam over the Mullaperiyar to deflect its waters to the Madurai district for irrigation and leased out for this purpose 8000 acres of forest land to the government of Madras for a period of 999 years and if necessary, for another 999 years[xiii]. The agreement on behalf of the Maharaja was signed by his Dewan V. Ramiengar. Formal sanction to the Periyar dam was received in the latter half of 1887 and the preliminary works were commenced in the month of September 1887 with a small establishment.[xiv]

Lord Connemera, the then Governor of Madras formally inaugurated[xv] the project by cutting a tree. By March 1888 most of the preliminary works could be said to have been completed. Most of the labour force came from Madurai and Ramanathapuram districts. Anyone who could just read and write was employed as mistry mainly for organising the labour. A great number of the coolies came from Cumbum Valley whose frequent absence from work caused hindrance to the progress of work. As the work progressed, a better

and more permanent class of coolie was obtained from Tirunelveli district. They were regular and worked steadily till the end. The construction involved the use of troops from the 1st and 4th battalions of the Madras Pioneers as well as Portuguese[xvi] carpenters from Cochin who were employed in the construction of the coffer-dams and other structures. Their services could be utilized in works connected with coffer dams, temporary sluices, timbering, shoring and scaffolding. Good quality stones, lime and sand and materials of long lasting quality were available. Fortunately, when the work in the main dam started, a team of good masons turned up from Cutch quite unexpectedly and did good work. But, slowly they withdrew from the construction work. Then large number of masons and drillers came from Coimbatore and Madurai districts and they did most of the work[xvii]. The stone, principal constituent of the dam is of the hard syenite variety, weighing about 2880 kg/m^3. The syenite rock being free from cracks and fissures and remarkably homogenous, formed an excellent foundation for the dam. It blasted well and broke up clean and sharp for concrete, but not fit for dressing for coursed rubble or ashlar. A portion of the stone used in the main dam and baby dam came from the excavation for the right bank escape and the rest from quarries. There were several rock out-crops yielding the required amount of stones. The lime used was obtained from nodular kunkar excavated from quarries near Kuruvanuth satisfying the requirements regarding strength and setting. Surki was prepared in the usual manner of tiles about 2.5cm thick and 10cm square, slightly under-burnt in small clay kilns. A very good quality of sand was obtained from the river bed. The mortar was composed of 3 parts by volume of sand, 2 of lime and one of surki.

The construction of the main dam construction commenced at the beginning of the year 1888. Many innovative methods for diversion of floods, rope-way, construction power etc., were adopted and the dam was formally opened in October 1895[xviii]. It was formally inaugurated by Lord Wemlock[xix] the then Governor of Madras. The work on the Baby Dam was completed in February 1896.

When the Primary construction work was executed, the dam was washed away by flood water. The British Government gave up the dam construction project due to heavy financial loss. But Penny Cuick did not get disheartened. He went to London and sold his properties[xx].

He came back to India to resume the dam construction work with his personal money. With his efforts dam construction was completed in 1895.

The Salient features of the dam as mentioned in the agreement are as follows:[xxi]

Type of Dam	: Masonry Dam
Length of the main Dam	: 1200 ft. (365.76 mt)
Top of the Dam	: 155 ft. (47.24 mt)
Top of the Solid Parapet	: 158 ft (48.16 mt)
Maximum height of dam (from deepest foundation	: 176 ft (53.64 mt)
FRL (Full Reservoir Level)	: 152 ft (46.33 mt)
MWL (Design)	: 155 ft (47.24 mt)
Crest level of Spillway	: 136 ft (41.45 mt)
Maximum water reached during Floods (till date)	: 154.80 ft (47.18 mt) on 03.1.43
Spillway Capacity	: 10 vents of 36’ x 16’ (10.97 m x 4.88m)
Storage Capacity (gross)	: 443.23 m.cu.m (15.662 TMC.ft)
Live Capacity	: 299.13 m .cu.m(10.563 TMC)
Irrigation benefit in Tamilnadu	: 68558 ha(169408.68 acres)
Length of Baby dam	:240 ft (73.15 mt)

After the construction of the dam was over, People in the Vaigai basin prospered as their agriculture got boomed.

In the Mullaperiyar dam, water impounded upto 136 ft cannot be used for irrigation. If water is stored from 136 ft to 152 ft[xxii], Tamilnadu can get 8.8 TMC water. In 1899, thePeriyar lake along with the surrounding area was declared a reserved forest by the then Maharaja of Travancore. The status of these reserved forests was raised to that of a Wildlife Sanctuary in 1950 and it was declared as the Periyar Tiger Reserve (PTR) in 1978.[xxiii] British engineers in the service of the Government of Madras, started generating electricity from the diverted waters of Mullaperiyar for which they sought no permission from the Maharaja of Travancore or his government .They conceived , on more practicable terms, the Periyar hydro-electric scheme in 1929 and its implementation was taken up at the behest of the Madras Government in 1933[xxiv]. And for the successful completion of the scheme, the force of the flow of water was a major factor. The length of the Irrigation tunnel was extended from 5887 to 6680 ft and improvements, including its lining, were carried out to increase its discharge from 1320 cusecs to 1600 cusecs. A new power tunnel, 4000 ft long, was constructed. On completion, the Periyar 140 MW Power generation station was inaugurated on February 11, 1955[xxv]. The Travancore State contended that the Madras Government had no authority under the indenture to produce electricity out of the waters given exclusively for irrigating the arable land in the Madurai district. Pennycuick described the operations as the most anxious, difficult and exhausting of any project which had come within his experience. Working with him on the project was A.V. Ramalinga Iyer, who was to later become the first Indian Chief Engineer of the PWD. The entire working of the project was detailed in a book titled *History of the Periyar River Project* written by A.T. Mackenzie, who was another of [xxvi]the engineers on the job. The success of the project saw more and more honours for Pennycuick. In 1893, he was made a member of the Madras Legislative Council. He was conferred the C.S.I. (Companion Star of India) in 1895. On retiring from the Public Works Department and returning to England, he was appointed

the President of the Royal Indian Engineering College at Cooper's Hill, a post he held from September 1896 to September 1899.The Public Works Department Office at Madurai houses a life-size bronze statue of Pennycuick. The PWD complex itself was named after Pennycuick by the state government. The PWD has erected four statues of Pennycuick on its premises, including a bust at the Periyar dam. The other busts are seen near the PWD Inspection Bungalow in Thekkadi and on its sub-divisional office premises at Uthamapalayam.Farmers of Appantirupathi unveiled a granite portrait and distributed sweets on his birth anniversary. A memorial to Pennycuick at the Lower Camp in Theni district was unveiled in January 2013.A new bus terminus in Theni was named after him in December 2013.

At Veerapandi, Balarpatti, Kutchanoor and Kuzhiyanur in Theni district, Pennycuick is remembered during the celebration of the traditional Thai Pongal harvest festival. Many children in this area are named after him.[xxvii]The people of Palarpatti in Theni district venerated the great man by preparing pongal in front of his statue on his birthday. Many of the farmer families of the Theni and Madurai districts still keep portraits of Pennycuick and worship him as a god. Villagers prostrate before his portrait, offer prayers, decorate with garlands and perform aarati to his photos which are usually kept in the hall or in pooja room along with images of other gods[xxviii].

References

i. S. Senthil Kumaran, Izhanthathu Devikulam Mattum thaana? (Is it only Devikulam that was lost?) Puthiya Thalaimurai, 26th January 2012,p.5.
ii. Civil Original Jurisdiction in the Supreme Court of India,Writ Petition (c),No.386 of 2001, R-128/06,New Delhi, February 27, 2006,p.2.
iii. C.V.J.Varma, A.R.G.Rao, & E.Sundaraiya.,(Ed.),Typical Dams in India,Central Board of Irrigation and Power, New Delhi,1990,p.309.
iv. Pazha Nedumaran, Tamilagam : Nathineer Prachchanaigal, (Tamilnadu : River Wate issues), (Tamil),Sneha Publishers,Chennai,1996, p.32.
v. K.M. Abbas, Periyaru Anai Sila Unmaigal,(Some facts about Periyar Dam), (Tamil), Oruginaitha Grama Valarchi Society (SIRD),Madurai,2006, p.4.
vi. C.V.J.Varma, A.R.G.Rao, & E.Sundaraiya, (ed.),Typical Dams in India, Central Board of Irrigation and Power, New Delhi,1990, p.312.
vii. Ibid.p.309.
viii. Bharat Nair, MullaperiyarDam & Sabarimala: The religious roots of the controversy, p.1, (http://Indian realist.word press.com)
ix. Vengadasamy. R,. Mullai Periyaru Anai,(Mullaperiyar Dam), (Tamil), Tamilosai Pathipagam,Kovai,2007, p.11.
x. Pazha. Gomathinayagan, Tamizhaga Pasana Varalaru, (History of Irrigation in the Tamil Country), Pavai Publications,Chennai,2010,p.102.
xi. Ibid.,p.104.
xii. C.V.J.Varma, A.R.G.Rao, & E.Sundaraiya, (ed.),Typical Dams in India,Central Board of Irrigation and Power, New Delhi,1990, p.314.
xiii. S.N.Sadasivan, River Disputes in India-Kerala Rivers Under Siege, Mittal Publications, New Delhi,2003.p.20.
xiv. R.Vengadasamy, Mullai Periyaru Anai,(Mullaperiyar Dam), (Tamil), Tamilosai Pathipagam,Kovai,2007, p.15.
xv. K.M.Abbas,Periyaru Anai - Sila Unmaigal,(Some facts about Periyar Dam),(Tamil),Orunginaitha Grama Valarchi Society (SIRD),Madurai,2006, p.5.
xvi. Mullaperiyar Dam,(http://en.wikipedia.org/wiki/Mullaperiyar_Dam), p.7.
xvii. K.M.Abbas, Periyaru Anai Sila Unmaigal, p.7.
xviii. Civil Original Jurisdiction in the Supreme Court of India, Writ Petition (c),No.386 of 2001, R-128/06,Newdelhi,February 27, 2006,p.16.
xix. Urodi. Veerakumar, Mullai Periyar: Anaiya, Neruppa?,(Mullaperiyar :A Dam or fire?), (Tamil),Tamil Pathipagam,Madurai,2007,p.18.
xx. Mullaperiyar Dam,(http://en.wikipedia.org/wiki/Mullaperiyar_Dam), p.7.
xxi. K.M.Abbas,Mullaiperiyaru Meiyum,Poiyum, (Mullapperiyar:Reality and Myth) Periyar Dravidar Kazhaga Veliyeedu,Udumalpet,2012,p.7.
xxii. Civil Original Jurisdiction in the Supreme Court of India, Writ Petition (c),No.386 of 2001, R-128/06,New Delhi,27 February , 2006,p.18.
xxiii. R.V.S.Vijaykumar,Er.A. Veerapan,Mullai Periyaru Anai: Sikkalukku ennathan theervu?, (Mullai Periyar Dam : What is the remedy for the issue?), (Tamil), Mootha Poriyalargal Veliyeedu, Chennai,2009,p.2.
xxiv. C.G. Madhusoodhanan and K.G. Sreeja, The Mullaperiyar Conflict, National Institute of Advanced Studies, Bangalore, 2010. p.11.
xxv. S.N.Sadasivan, River Disputes in India-Kerala Rivers under Siege, Mittal Publications, New Delhi,2003,p.26.
xxvi. Ibid.,p.26.
xxvii. By way of showing their gratitude, the people of beneficiary districts name the male babies after the name of Pennycuick; Interview with Anandhan, Madurai, on 18.04.2011.
xxviii. The Times of India, Pennycuick memorial, a temple for us, say farmers, 16 January,2013.