

Taking Sri Lankan Water Technology to its grassroots: Lessons from recent hydraulic Engineering Indiscretions

Book Reviewed by
M. B. Mathmaluwe

ENG. D.L.O. MENDIS' new Book, "Water Heritage of Sri Lanka", comprises several of his papers presented at various learned fora both here and abroad, collectively making an in-depth study of Sri Lankan Water Technology. These have all been delivered in the year 2002 except one, presented in 1995; each of these Papers forms a Chapter of the book and, except for Chapter 1, all others carry lengthy, comprehensive annexures one running into 46pp and another into 36pp. It also includes copious notes and references. This book, carrying the scholarship of a life-time, a life devoted largely to the study of this subject, will, no doubt make a substantial contribution in the field of Water Technology in Sri Lanka.

Reading the book closely, one would notice an overall, single, clear thesis emerging, the key-note of which is the author's faith and conviction in the efficiency and all-time validity of the ancient Sinhalese engineer's fool-proof technologies of water management, slowly developed over the centuries from the pre-Christians Anuradhapura period (c.a.2nd Cent. B.C.) to the end of the Polonnaruwa period, to be exact, to the end of King Parakramabahu I, making in all, a period of at least 14 centuries.

D. L. O. Mendis' thesis has been taking shape over the years; true, he makes tentative references to it in his earlier contribution: i.e., in his book, "Evolution and Development of Water and Soil Conservation Ecosystem and also in the book edited by him," WTO Globalization and Eppawala after Seattle", where he in Part III, runs a Paper on "Hydraulic Civilizations, Irrigation Systems and the Modern State" Presented at the Prof. E. O. E. Perera Commemoration Lecture in 1989; however, it is in this book that this Thesis takes its final and conclusive form.

D.L.O.'s entire thesis hinges upon the difference between the modern treatment of Water Management (for Agricultural purposes mainly paddy cultivation) from the perspective of Hydraulic Engineering and the ancient Sinhalese engineer's approach to it from the Soil and Water Conservation Ecosystems perspective. In successive Papers, with great persuasion, he demonstrates the vital difference between the two systems with pin-point precision, he has a tabulated these differences, demonstrating in detail, in which aspects the two systems differed, often radically, from each other. (see P.181).

The departure of the one system from the

other is so complete that in his Paper "The National Water Heritage of Sri Lanka" (Ch. 3), presented at the the Pugwash Conference on "Science and World Affairs? La Jolla CA, Aug.10-14, 2002, he says, it is wrong to name the ancient Soil and Water Conservation Ecosystems evolved by the ancient Sinhalese, as 'The Ancient Irrigation System', which, he says, would be a total misnomer. In a landmark pronouncement, DLO makes a clear distinction between the Water Technology developed, based on the Western hydraulic principles and the Water Technology based on the principles of Soil and Water Conservation Ecosystems, evolved by the ancient Sinhalese engineer. According to this letter system, three inter-linked processes function, namely, (1) tapping and deploying water for crops (mainly for paddy), (2) preserving the continued fertility and texture of soil of the drainage basins and (3) the care for and protection of the vegetation (forest cover) for the preservation of the humidity of the soil and a continually replenished water-table of the basins without which the other two may even fail.

It is in this context that of all the river-diversions and the connected networks of channels, the author singles out, as a perfect example, the ancient (not the restored one) Elahera - Minneriya canal, its superbly constructed embankment and all its distributor sluices and 'Water-spills' and its diversion weir at the intake on the Ambanganga. He has nothing but praise for it this marvel of engineering in the field of Water Management Technology, which he says, is even better than the renowned Kalaweve - Jayaganga Complex. Incidentally, DLO is not alone in his praise: the earliest British engineers Bailey, Adams and Churchill who saw it first, in modern times (1855), and presented their survey report on it to the Governor (Ward) have marvelled at the ingenuity of the ancient engineers who constructed it.

These British engineers, suffering great hardship, carried out the survey of the entire course (24 mls.) of the canal. It is they who, for the first time, mention the traces of a series of vast inland lagoons which, they said, were formed by the back-waters held by the canal along its northward course, when King Parakramabahu I raised the existing diversion weir at the intake on the Ambanganga, to augment the water of the Minneriya, Kantale, Giritale and Kaudulla reservoirs. The inundation from this backwater extended westwards until it reached the foothill spurs of the Konduruwawa range, spreading anything upto 10 mls. in the west bank of the canal, judging by the huge Kumbuk trees that stand

stranded far in the jungle, a sure sign to indicate the reach of the water.

Brohier who came upon this Report, included it in his classic, "The Ancient Irrigation Works of Ceylon" (Part I), but did not know exactly where these lagoons were and was unable to identify them with the Second "Parakrama Sagara" (not to be confused with the better known 'Parakrama Samudra' in Polonnaruwa) and, mentioned in the Chulavamsa as "Kothabaddhanijjara" (meaning, 'the dam that holds the flood-waters') but, is now discovered and identified by DLO as claimed in his book. He dwells upon it long and exhaustively as a marvel in the Science of Water Management and singles it out to demonstrate the differences between the ancient canal and the restored (1936) canal. What is important to note is that the original canal did not ignore and by-pass the drainage flowing down eastwards from the Konduruwawa range the basin to, the left bank of the canal, in no less than seven perennial and seasonal streams, namely, Kongete Oya, Karandagolle ela, Baxamunanne ela, Radavige Oya, Kottapitiya Oya, Kiuvanahinne Oya and Attanakadavala Oya. The ancient engineer intercepted all this massive volume of water and managed it by building stone embankments and spills across them and, by means of sluices and 'water-spills' along its course, distributed it to the fields along its course below its right bank. It is calculated that this embankment, rising to an average height of 50ft., but reaching in places, to 90ft., holds 3,800,000 cu.ft. of modern engineers ignored all the drainage on the left blankets built their canal to CONVEY 250 cusecs of water from the Ambanganga to Minneriya Tank (this was later increased to 1000 cusecs) and let the precious drainage from the western basin all along its course to go waste. When they met the drainage streams, they simply built concrete 'fly-over' aqueducts above the streams — thus ignoring all concerns of soil and water conservation ecosystems of the basin.

In this connection the author raises some serious issues with today's hard hydraulic engineering methods, which should be an eye-opener to the authorities in this field: from the stage of entrusting feasibility studies of mega-construction projects, wooing foreign funding agencies, and accepting, with their money, their engineering personnel and expertise to the stage of blissfully closing their eyes to our own age-old time-tested heritage of Water Management. DLO says:

".....the the great significance of all should not escape us.....we are being turned away from

our own heritage, the ancient irrigation system of Sri Lanka, and wooed by an emerging dominant alien influence." P. 94.

With such pronouncements as this, certainly, DLO has not endeared himself to the authorities and the local engineering community. His absolute faith in, and respect for the traditional wisdom in the ancient Sri Lankan engineer's pervasive and broad-based knowledge of Water Technology has earned him the slander that he is suffering from the 'Mahavamsa Syndrome' meaning that he is blindly worshipping the past glory as detailed in that great Chronicle; but he has time and again shown that the old engineer's brilliance in the field has never failed and that in the end, proved that it had been his modern counterpart, proceeding from false premises and flawed principles, who had erred. This stand of his had been accepted even by the early British engineers who had familiarised themselves with the amazing ingenuity of the old Sinhalese engineers in this field he quotes Henry Parker, the British Engineer:

"If we rashly think after a mere glance at the site (in comparison on the other hand, with the actual practical experience of the Sinhalese for nearly a 1000 years) that we can change all that and effect untold improvements on their general designs of the ancient works, we may find too late, they were right and we were wrong."

P.99 (Extracted from Brohier.)

As regards the present practice of borrowing foreign expertise, some of the views the author holds deserve the attention of the authorities who seriously think of using such expertise on local constructions under local conditions; he says:

"Technology is like genetic material: it carries with it the genetic code of the society which conceived it."

This is wisdom that demands attention: will such imported technology fully cater to the conditions peculiar to this country?

Dealing with the Elahera canal restored by the modern hydraulic engineers in the early 1930s, DLO refers to the sort of hem-handed restoration work on the foundations of the spillwaters of the Kothabaddhanijjara (the Second Parakrama Sagara); he says:

"The above report (of the Colonial engineers) describes the remains of the spill-water which had been more evident in 1855 than it is today, thanks to the restoration and repairs done by modern engineers ears ignorant of History and not concerned with understanding the wisdom of the ancients." P.124

Again, the author makes some telling remarks on the methods and technical skills of some of

today's engineers who deal with the technicalities of reading contours on topo-sheets where contours are marked at 100 ft. intervals and the new ones converted to the 100 meter intervals he refers to the difficulties involved in studying and understanding the ancient soil and water conservation ecosystems on the new sheets says that much useful information in the old sheets is lost in the

"Researchers must revert to the old sheets as I have found from personal experience; but younger engineers may not be even be aware of the difference." P.124.

He further elucidates the vital difference between the traditional technology and the new in his 36-page Annexure, "Some Thoughts on Technology Transfer for Irrigation and Multipurpose Development Projects in Sri Lanka" (a contribution to the Journal of the IESL, "Transactions") and attached at the end of Ch. 8.

Another matter he deals with at length in this book is the penchant of the authorities for mega-constructions which appeal more to popular imagination, but can be of less practical benefit, both from the angle of utility and from the view of long-term benefits they can pass on to the farmer community by promoting unity and co-operative living, as formulated by Nobel Laureate, John Nash, that "Self-interest coupled with concern for the good of the group is more likely to yield greater benefit for all" in the use of water. (p.213)

In the context of the authorities so readily opting for the megaconstruction, he severely criticises the planners of the Udawalawe, Lunugamvehere and Samanalaweve Projects which have cost the Govt. massive sums of money but have turned out to be largely failures mainly because of faulty siting and, about which DLO had warned them well ahead but had been ignored and his suggestion of better sites had been overlooked. In the Samanalaweve, because of a geological fault in the site, it had sprung a serious leak and, inspect of various remedies tried, it still remains obstinately unstoppable: the 'wet-blanketing' has cost 1.5 billions but has failed, too. He says that launching upon such massive projects, engineers should be provided with adequate checks and balances to minimise chances for errors before it is too late. For instance, he says another senior engineer may be provided as "Sparring partner" to keep the other engineers alert and more circumspect, to head off disasters awaiting. If it is not a weakness, it may be called a trait with "specialists" cellist" and "experts" in any field, that they are unwilling to admit expertise from other disciplines, not only by way of enhancing their own skills, but also to prevent possible errors by following just one line of approach to a problem: there is a popular belief that experts are like horses in blinkers, they can see only what they are taught to see: they are usually, not used to thinking on a wider spectrum.

He says that this practice of building mega-reservoirs by submerging existing smaller tanks, stands in stark contrast to the old Water Technology, evolved and practiced for over 14 centuries so successfully in this country. The old engineer preferred smaller tanks and when he did have to build larger ones, he provided them with a series of "cascading" smaller tanks below them to intercept the overflow — the one above feeding the one lower down, thus 'farming' out the water allowing nothing to flow waste. It is worth while to remember that DLO has carried on a one-man crusade against the construction of the Maragahakanda Reservoir, precisely for water and soil conservation ecosystems reasons this is the only remaining mega-construction from, the "Water Resources Development Plan of 1959" together with the canal designed to convey (repeat 'convey') water from it to the North.