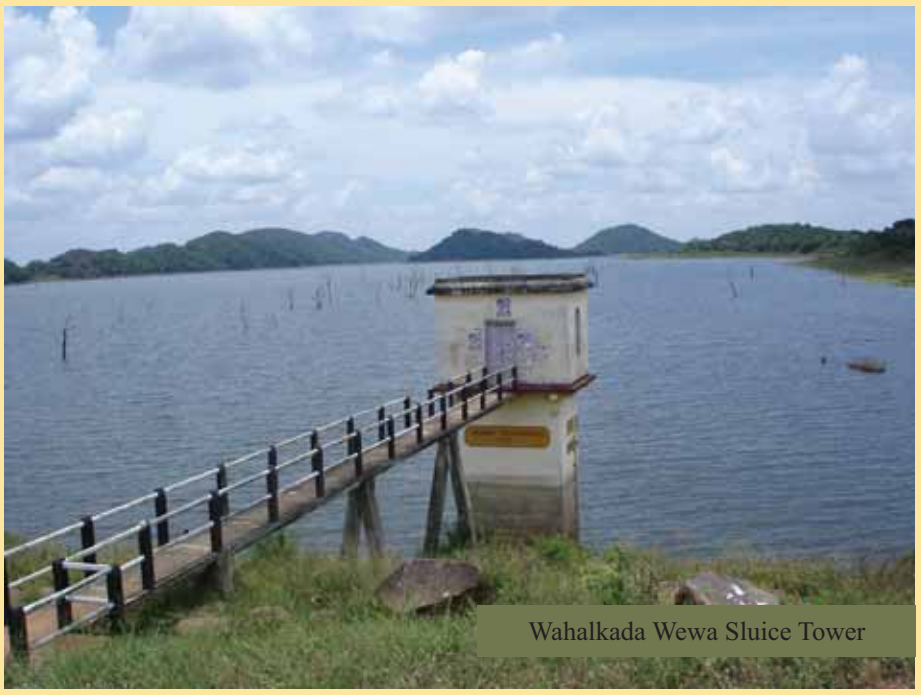
is a cylindrical burnt clay-pipe coming from inside the tank and laid horizontally under the bund to exit the water. To this horizontal clay-pipe is connected a few short cylindrical clay tubing each of about 1.5 ft in height so that they all fit-in easily forming a vertical tubing to sustain the water around it. This formation is operational and manageable at smaller depths of (say) 10 ft the maximum. The connected short tubes would form a vertical 'sluice shaft', and the tank water would enter the 'sluice shaft' for exit by spilling over the topmost tubing, and definitely not from anywhere else. This methodology is more similar to the 'Morning Glory Spill-cum-Sluice' of the west where the spill and the sluice water both take the same outlet. In here, the spill water would travel vertically down the fitted short tubing and then move horizontally to exit the tank. In this regard, the author of this article feels very strongly that this concept used in *Keta Sorowwa* some more than 2200 years ago, was also an original thinking of our ancient water engineers, and the west would have got the idea of *Keta Sorowwa* from Sri Lanka and subsequently named it to look differently as 'Morning Glory Spill-cum-Sluice'.

For large reservoirs, since the irrigation water has to be sent down along the irrigation channel system for the cultivations which are usually located a few miles downstream, it is always advantageous to pick up the water at a level more close to the bottom of the tank with a substantial head of water, unlike from the top as in *Keta Sorowwa*. Consequently in order to collect water from the bottom, the structure has to be constructed more stronger than that of the *Keta Sorowwa* as it has to bear up a big pressure owing to the high head of water involved. Also operating at these bigger heads, there is an essential need to control the valves properly, and the system management should be able to sustain the intense pressure involved. Only as a solution to remedy this situation, our ancient Sri Lankan water engineers developed the design of the *Biso Kotuwa*. As mentioned earlier, the *Biso Kotuwa* functions in the regulation of the outward flow of water from the tank. In consequence, the *Biso Kotuwa* in the simplest form is a square chamber fitted with an inlet to bring-in water from inside the tank, and an outlet on the opposite side of the chamber to exit the water from it. Therefore, all the management and operation of the sluice tower would be done through this square chamber. In most of the ancient *Biso Kotuwa*, this square chamber has essentially being constructed using stone masonry to handle the intense pressure it encounters at higher heads of water. Although the outer structure of the sluice tower had sometimes being constructed using bricks, all the internal areas where the water gets in contact with, had been lined using stone masonry to withstand the high pressure anticipated within the chamber.

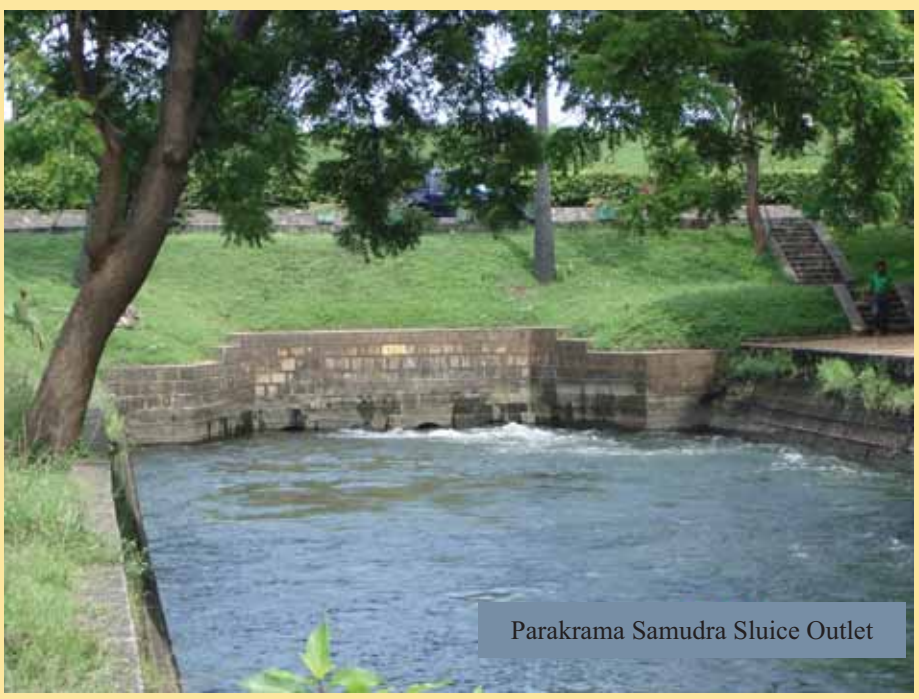
Inside the square chamber, two timber doors are fixed one to cover the inlet and the other to cover the outlet opening. Even though the operation of Biso *Kotuwa* in the ancient days is not available to us now, one could guess what it's operation would have been at that time. To start the *Biso Kotuwa* operation, it is essentially needed to close down the outlet door of the chamber properly, and then open the inlet door to allow the tank water to come into the chamber through the inlet. Then the inside of the chamber will quickly get filled up with water, up to the same water level of the tank. Then the inlet door of the chamber would be properly closed, and subsequently the outlet door opened, allowing the water in the chamber to exit along the outlet so as to move onto the irrigation channel system to convey water to the cultivations. The process is repeated as many times as possible depending on the water need. RL Brohier (2012) surmises that elephants would have been utilized as the strength and the power needed to lift the chamber doors at higher heads of operation. Henry Parker (1909) points out this greatest and original invention of *Biso Kotuwa* by the ancient Sinhala irrigation engineers remained essentially unchanged for more than 2000 years. Without some efficient means of regulating the discharge of the water through the sluices, the provision of reservoirs for storing water could never have been extended beyond the minor tanks.



Wahalkada Wewa Sluice Tower

During the Uva Rebellion in Sri Lanka around 1818, the local residents of Wellassa-Uva rebelled against the British rulers, and the British ordered it's army to harm and demolish the dams, sluices and the water resources systems of the area in order to overcome the revolt. As a result, the Uva Province lost most of its major and moderate tanks, and a huge multitude of village tanks. As the name *Wellassa* implied, '*Wel-laksha'* meaning 'one lakh of paddy lots', and the Uva Province had lost all of it after 1818 uprising. Eventually, the locals could not live in there anymore owing to the shortage of basic needs such as food and water, and the population started shifting to other areas. As a result, Uva-Wellassa remained as a barren, unpopulated and neglected area for the rest of the period of British rule namely from around 1818 up to the independence in 1948. The 1970 Government under Madame Sirimavo Bandaranaike with Maithreepala Senanayake as the Minister of Irrigation started the Lower Uva Development Programme to restore a few major tanks such as Muthukandiya and Rambukkan Oya Reservoirs.

Henry Parker (1909) points out that when Governor Brownrigg ordered his army to demolish the sluice towers and other structures, they all remained quite solid, strong and robust. Henry Parker (1909) was of the view that with the demolition of these sluices, the 'Sri Lankan Identity' or the 'Sri Lankan Mark' in the development and invention of the *Biso Kotuwa* was very much suppressed and subdued over the years. Instead, the British introduced a slightly different technique using stilling basins to dissipate the energy created by the high heads of water. In the modern day designs, the stilling basins are incorporated either within the sluice barrel or outside of it. It could be noted in most of the sluices that were constructed by the British in Sri Lanka since 1900, under the PWD (Public Works Department) or Irrigation Department in their restoration works of ancient tanks, were with the stilling basins located outside the sluice barrel, though the new sluice at Wahalkada Wewa had the stilling basin integrated inside the barrel so that the water had been calmed down before moving onto the channel.



Parakrama Samudra Sluice Outlet

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