THE DESTRUCTION OF AN ANCIENT IRRIGATION VESTIGE: A CASE STUDY ON THE BREACH OF THE HISTORICAL KIVULEKADA TANK OF SRI LANKA

Muditha Prasannajith Perera,
Senior Lecturer, Department of Geography,
University of Peradeniya,
Peradeniya, Sri Lanka.
E-mail: mudithpras@gmail.com

Abstract
Kivulekada tank was one of the examples for historical vestige of ancient tank irrigation technology in Sri Lanka. This was a medium scale tank built by king Mahasen’s period (273-301 A.D), which contained many historical irrigation features, including “outside spill”, “sediment trapping tanks” and “sluice front ridge”. Previous Irrigation Directors such as Kennedy, have given important and significant messages to irrigation engineers in Sri Lanka in 1933, with the aim of protecting these important features. However, with recent rehabilitations, the ancient characteristics of craftsmanship of building tanks were slowly fading away and some important features were also mislaid or lost. Current climatic extremes create some of the pathetic controversial situations, emphasizing the importance of ancient tank irrigation technology. “Kivulakeda Tank” is the most recent illustration on this matter. The study, conducted using direct observations, interviews, metric maps, google images, comparisons and secondary sources.

Key Words: Irrigation Technology, Small Tanks, Breaching, Sluice, Spill, Front Ridge.

1. Background
Sri Lanka is famous all over the world for its superior Tank Irrigation Systems, since B.C. period. The center of this irrigation industry was Rajarata. In 1957, Arumugam very clearly described the relationship between the village and the tank. According to him, “a tank means a village, and a village means a tank”. A tank supplied all the needs of the people in the village and the people were very dependent on the tank. When the breach of a tank occurred, all the people migrated to another village as they did not have any means of livelihood.

Villagers don’t migrate when a breach of a tank occurs in modern times, but however it is a tragedy. There is one occasion in history when the breach of village tanks were blessing. This was the destruction of village tanks in Rajarata due to excessive rainfall and flooding, in 1923. The “assessment report” on this breach and further potential, compiled by Emerson, Bedell and Kennedy, was paid attention on this “unique tank

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1 S. Arumugm, Development of Village Irrigation Works, Ceylon Irrigation Department, 1957 (p.9)
2 S. Arumugm, Development of Village Irrigation Works, Ceylon Irrigation Department, 1957 (p.9)
system” in the island. This was the first systematic study on small tank system in the island. The report was handed over to the British colonial rulers in 1926.

Kennedy was the most famous Director of Irrigation who lived during this decade. Although he was a foreigner, he gave the most important and significant message to irrigation engineers in Sri Lanka, in 1933. According to him, “Every village irrigation work in the island has an individuality of its own and when identified a tank on the topographic map, the engineer has to acquire the sense and substance of that individuality of each tank.” This quote is applicable to Sri Lanka because Sri Lanka had a highly skilled and flourishing tank and irrigation system even as far back as 3rd Century AD.

However, the question is whether this proposition put forward by Kennedy is still continuing. One of example that brings about the discussion of the above proposition is the inspection of the breach of the Kivulekada tank that has been built across a tributary of the Yan Oya in the Dry Zone. The Kivulekada tank which is located in Anuradhapura district was a historically most outstanding, medium scale tank with some spot endemic irrigation techniques in the world. It was breached, destroying the entire command area and part of the village, on 4th February 2011.

2. Methodology

In order to understand the reasons for this destruction, it is necessary to study the primary and secondary sources. This area was inspected five times by me and a Research Assistant appointed for this task. In addition to finding information from the farmer organization, the necessary data and information was obtained from 20 teachers and senior villages in the area. The help of 5 senior villagers was obtained to collect information on the historical facts of the tank. Further historical sources of evidence were studied. 1:50000 metric maps were analyzed and Google images were also used. Further statistical assistance was obtained from the Galenbindunuwewa Irrigation Engineers Office and the Agrarian Service Office. Further, the extent to which this tank was used in the past in relation to the present was analyzed. Also, the author’s previous studies on Dry Zone tanks and comparative studies with other medium scale tanks were also used to gain an in depth knowledge of the present incident.

3. The Kivulekada Tank and the Extent of Damage

This tank, which is situated at Northern latitude of 80.18’ – 80.20’ and Eastern longitude of 80.48’ – 80.49’ was built by King Mahasen’s period in AD 273 -301. According to legend, this was built by the sister of King Mahasen. In 1955 this tank was renovated and has a capacity of 7800 per acre-feet. The sluice capacity water level at spill level is 7.2 m, and the height of tank bund is 13.5 m and the width at the bottom is 18m and the top width is 4.5m. The length of the spill is 36m. The command area of the tank is 321 hectares and access water is distributed to 80 hectares of paddy lands. According to the classification of tanks in Sri Lanka, this tank comes within the medium scale category, according to the capacity and the

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3 Ibid (p7)


6 Irrigation office data, Galenbindunuwewa, 2012
command area. There are 7 distribution canals to the main irrigation canal of 6 km length and 300 farmer families and 25 fisher families live adjacent to this tank. 

Figure: 1  Location of the Kivulekada tank

![Location of the Kivulekada tank](source: 1:50,000 Map)

The 2010/2012 monsoon was very strong and stretched up to February from November, of the previous year. Thus in January these areas experienced 286 mm of rain and in February and it was 236 mm. From February 1st to 4th there was heavy rain and 85 mm of rain was recorded on 2nd February. In addition, the tank had been spilling by 3 feet and the spill site got breached and the water flow has been similar to that 10 m. height Tsunami wave. This happened at about 2.30 am on 4th February 2011. With this strong wave, there occurred a trench that was 10 meters deep and 300 meters long. Concrete and metal pieces of the sluice

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7 Farmer organization reports, Kivulekada tank.

8 Rainfall data – Maradankadawala Station

9 Interviews and discussions - 2011

10 Interviews and discussions - 2011
had got carried away by about 700 meters and huge trees had got ripped and torn apart. Paddy fields about 60 acres in extent were filled with sand and mud. About 800 acres of land had got destroyed later, without the irrigated water\textsuperscript{11}. This year many small tanks had got breached due to heavy rainfall and Kivulekada was the only medium scale tank that suffered the most amount of damage.

\textbf{Figure: 3}  Breach of the dam at the spill point

![Breach of the dam at the spill point](image1.png)

Source: Field observations, 2011

\textbf{Figure: 4}  The impact to the paddy lands

![The impact to the paddy lands](image2.png)

Source: Field observations, 2011

\textbf{Figure: 5}  Large trees at the command area as bushes…

![Large trees at the command area as bushes…](image3.png)

Source: Field observations, 2011

\textsuperscript{11} Farmer organization reports -2011
4. Analyzing the Factors that Led to the Breach of the Tank

4.1 Weakness of the place of establishment of the spill, recently

A belief held by the engineers and the agrarian service officials interviewed was that the pressure of the water was too great and the tank spill gave way. Nevertheless it was found that the tank spill was not in a dilapidated state. Further, it is a fact that ancient tanks built by the Kings, never breached at the spill point. That spills had withstood tremendous pressure and this poses the question as to why this tank had given way from this particular point itself.

During the time of the kings even and later, the spill of Kivulekada tank had been located at the Northern end of the tank, where the water pressure is comparatively low. Still the ruins are there\(^\text{12}\). Although this has been the historical situation, the spill is now located in the middle area of the dam and the deepest part of the tank where the pressure is very high. As a result, the spill had given way. In 1955 with the rehabilitation programmes, it had been located at the present place\(^\text{13}\).

Figure: 6  Spill way of the King Mahasen’s period

![Spill way of the King Mahasen’s period](Source: Field observations, 2011)

Figure: 7  Location of the ancient spill and recent spill

![Location of the ancient spill and recent spill](Source: www.Google earth)

\(^{12}\) Field studies -2011

\(^{13}\) Interviews -2011 & Agrarian Service Dept. documents
4.2 Absence of the “Outside Spill” in addition to the “Main Spill”.
In every medium scale and large scale tank, there has been a mechanism from ancient days that is maintaining an outside spill (*Pita-wana*), in addition to the main spill to release excess water during the heavy rainy days. Good examples for this are the ‘Hurulu wewa’ built by the same King and the same capacity medium scale tank named ‘Manankattiya tank’ as shown in the diagram.

![Figure: 8 Both spills are operating in another same tank (Manankattiya tank)](image)

Source: Field observations, 2012

Accordingly, in Kivulekada tank also can be seen this unique instrument at the southern end of the tank, without maintaining a long period. There was a method whereby the water could be sent to the Koka wewa (one of the small tanks) that was located a bit beyond this respective tank\(^\text{14}\). With recent rehabilitation, the outside spill has been eliminated and only the main spill is available. Therefore the entire pressure of water is exerted on the main spill.

![Figure: 9 Historical spill and the outside spill of the Kivulekada tank](image)

Source: [www. Google earth](http://www.google.com)

\(^{14}\) Interviews and discussions -2012
4.3 Not understanding the unique mechanism of the “Sluice Front Ridge”

The Kivulekada tank with a sluice gate is the only tank that had a wall around it\textsuperscript{15}. It is consisted of earth dam with trees and covering the front side of the sluice gate. We can identify this mechanism as “Sluice Front Ridge”\textsuperscript{16}. This is may be a spot endemic unique instrument of the world due to the absence of report elsewhere. According to folklore, the tank was built by the sister of King Mahasen and therefore this devise may unique to the tank. Normally, the main sluice gate is not open during spill times because of the pressure caused by the water towards the sluice gate and dam. The “Sluice Front Ridge” (\textit{Pera Vatiya}) has been developed as a solution and opens the sluice gate when spilling. Due to the front ridge, it will not cause damages or impact to the sluice or dam. The senior villages believe that this ancient device has been built the kings period to use, when the tank is full and to use at decisive occasion. The residents believe that this ancient irrigation device was not used, and hence the tank got broken. In 1955 and 1970s and 1980s this tank was rehabilitated, but that devises (Sluice Front Ridge), was protected. Unfortunately, after the breaching in 2012 bulldozers were used to rehabilitate the tank bund and in this process, this unique device was completely destroyed. Today we can see the device, only through previous satellite, Aerial and Google images.

![Sluice with historical “Front Ridge”](source: www.Google earth)

4.4 The collapse of the “Kulu Wewa” System

Irrigation scientists of Sri Lanka have identified the “Kulu wews” as a “Sediment Trapping Tanks” established covering the upper tributaries of Medium or Large scale tanks, in the Dry Zone. Further, these tanks control the sudden water flow to the main tank. These tanks collect the rain water temporally and releases it gradually downstream. The catchment area that spans about 16 S.km. and about three fourths of the area covered by the forest. According to the villagers, due to the sudden increase of rain, the water level of the tank rises rapidly\textsuperscript{17}.

\textsuperscript{15}No evidence of this kind of device at another tank.

\textsuperscript{16}“Sluice Front Ridge” is an earth dam in front of the sluice (at the tank side) to control the pressure of water flowing towards the sluice and height of this devise is more than spill level. Few trees were also there.

\textsuperscript{17}Interviews and discussions -2011
Thus when studying the metric maps (1:50000) No 32, it is apparent that in the catchment forest area of Kivulekada tank, there are about 13 tanks that are in an abandoned state. These would have been small tanks constructed to trap the sediment and control excess water. The villagers also proved that these are abandoned “Kulu wews” and abandoned old small tanks in the forest reserve without villages.

The rain water of the upper catchment area about 200 meters above sea level was transported to the Kivulekada tank that is situated about 115 meters above sea level, within 3 km\(^{18}\). Due to this all tanks were abandoned and breach of the bunds, entire rain water suddenly flowed the downstream Kivulekada tank. Thus this would have had drastic effects on the tank and contributed towards its destruction.

4.5 Disrespect to the ideas of the people

It has been the opinion of several senior villagers that there is a method to reduce this risk of breaching of the tank bund. Thus when the water level was rising during the end of the January the water level should have been controlled to protect the tank. They have communicated this to the irrigation officials in the area and had suggested that the sluice gate which is already protected due to “front ridge” should be opened at first, and next the dam cut in the corner where the shallowest part of the tank, to release the excess water\(^{19}\). But these advices have not been heeded\(^{20}\) and the final result has been the breaching of the tank bund and vast destruction of its environs.

5. Summary

The Kuvulekada tank, in the Dry Zone of Sri Lanka, was a medium scale tank and contains many traditional endemic irrigation features that were characteristic of king Mahasen period (273-301 AD). This tank was renovated in 1955 and later rehabilitated several times. The ancient craftsmanship of building tanks were slowly going out of style and the important features like “Outside Spill” (\(Pita-wana\)) and maintaining “Sediment Trapping Tanks” (\(Kulu wews\)) were lost. And also, the importance of the Sluice Front Ridge (\(Sorow Pera watiya\)) was not realized and it was a unique historical tank irrigation instrument, contributed by the Sri Lankan ancestors to the world. Further changing the Spill place of the tank bund by recent rehabilitators, and disrespecting the ideas of the people were led to this tank suffered much harm. In particular, the advice given by Kennedy in 1933 was also not recognized and all these have contributed to the present pathetic controversial situation.

REFERENCES


\(^ {18}\) 1:50,000 – Metrics map- No.32

\(^ {19}\) Interviews and discussions -2012

\(^ {20}\) Interviews and discussions -2012

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