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Securing cascade systems

Sri Lanka is reputed for its ancient hydraulic civilisation. The earliest reservoir as indicated in great chronicles such as Mahavamsa, was the Jayawapi (Basawakkulam Alias Abayawewa) built during the reign of King Pandukabaya (377 - 307 B.C). The construction of larger scale water sources was initiated during the time of King Vasaba and continued by Kings Mahasen (276 - 303 AD), Dhatuse-na (455 - 473 AD) and Agbo 11 (575 - 608 AD). This tank construction engineering trend has continued until the reign of King Parakramabahu - 1 (1153 - 1186).

Parallel to the construction of major tanks, small irrigation systems in the country have evolved in two forms referred to as tanks and anicuts based on the landscape, rainfall and the needs of the people. There are 14,200 small tanks and 12,950 anicuts operational at present though these numbers are higher with the irrigational bodies abandoned or absorbed into the forest cover and wildlife sanctuaries.

Tank cascades

Around 80 percent of small tanks are incorporated into tank clusters identified as tank cascades or Ellanga systems. A tank cascade is a connected series of tanks within the micro-catchment of the dry zone landscape, storing, conveying and utilising water from a rivulet. The tank cascade definition could be elaborated as an ecosystem where water and land resources are lined up within the micro catchments of the dry zone landscape providing basic needs of human, floral and faunal communities through water, soil, air and vegetation with human intervention on a sustainable basis.

Three main cascade zones are found in Sri Lanka, such as North and North Central, North Western and South and South Eastern. The number of tank cascade systems in Sri Lanka is 1,162, of which, around 90 percent could be included in these cascade zones.

A cascade system is an extraordinary environment and friendly strategy for thwarting floods and droughts. Among the invaluable services being rendered by the cascade systems are the controlling of the flowing of water along the surface of the landscape, replacement of interior ground water sources and water purification across various components of the cascade.

Our ancestors using their irrigational wizardry designed the structure of the cascade system in such a way that water flows from top to bottom from tank to tank feeding the paddy fields, enriching the ground water springs and fulfilling the water requirement of flora and fauna in the locality and eventually to feed the mother tank at the downstream which is the cynosure of the cascade system.

A renowned geographer, Prof C. M.M. Maddhumabandara in 1985 coined the name of this marvellous irrigational system as the cascade system and later Dr. M.U.A. Thennakoon introduced the Sinhala version of it as Ellanga. In view of the importance of the system as a global agricultural heritage, the World Food and Agriculture Organization has declared the Sri Lankan cascade system as a world heritage on April 19, 2018.

Main components

In other words, the Ellangawa or the cascade system consists of a cluster of minor irrigation tanks interconnected with an irrigational canal network. This ancient irrigation technology ideally suitable to the dry zone had been the basis for ancient hydraulic engineers under the auspices of great kings to convert



The Gallewa Wewa before rehabilitation

Tank cascade zones

Name of the cascade	River basins	Number of cascades
North and North Central	Malwathu Oya, Mahaweli River, Panna Oya, Pankulam Aru, Kunchkuban Aru, Yan Oya, Ma Oya, Mannal Aru, Per Aru, Kanakarayan Aru, Pali Aru, Paranki Aru, Nay Aru, Modaragam Aru, Kala Oya	617
North Western	Mi Oya, Rathambala Oya, Deduru Oya	255
	Kirama Oya Urubokka Oya, Walawe River, Malala Oya, Kirindi Oya, Menik River, Kumbukkan Oya, Karanda Oya, Maduru Oya	177
Total		1049

Rajarata or the North Central Province in to the kingdom of tanks or the Wew Bendhi Rajiya. There are around 14,500 functional small tanks, out of which, 80 percent are a part of the cascade systems. The Irrigation Department has identified 1,262 cascade systems. According to irrigation experts, a cascade unit consists of eight main components such as Kulu Wewa, Olagam Wewa, Ihala Wewa, Kayan Wewa, Ithathewa, Godawala, tank bed and a green tree growth.

The Kulu Wewa is for the use of wild creatures, thus controlling wild elephants invading the villages. Our ancestors cultivated chennas above the Kayan Wewa locality which prevented

sediment accumulating in the Maha Wewa being brought by the eroding water during the rainy season via the Kayan Wewa.

The Godawala in the shape of a pond in the higher region of the Maha Wewa acts as a collector of sediment, thus preventing silt from entering the Maha Wewa. The tank bed, which is normally a marshland, retains poisonous soil molecules and carbonic materials to keep the Maha Wewa clean and unpolluted. The *Katta Kaduwa* beneath, out of the tank bed, prevents contaminated water reaching farmlands under the tank.

President Gotabaya Rajapaksa has given priority, in the Vistas of Prosperity and Splendour policy statement, for the

rehabilitation of 5,000 rural tanks which come under cascade systems spreading all over the country mainly for promoting drinking water facilities and improving agricultural economy. The *Wari Saubhagya* program aims at rehabilitation, renovation and restoration of dilapidated minor irrigation tanks and anicuts in 25 districts to achieve main three objectives: to enhance the agricultural productivity and water productivity for enhancing the living standards of rural people, to develop tank related activities as an economic entity for the generation of various other income sources, and to improve and maintain the components of the tank cascade systems thereby enabling tanks to withstand floods and

droughts. It is envisaged to complete the rehabilitation of 5,000 rural tanks within the next three years. During 2021, it is targeted to complete the renovation of 1,000 rural tanks, for which, Rs. 3,000 million has been allocated. However, by October 2021, the target has been exceeded by rehabilitating 1,200 tanks and anicuts by the State Ministry of Tanks, Reservoirs and Irrigation Development Related to Rural Paddy Field under the guidance of the Irrigation Ministry.

Village irrigation systems

The Wew Gam Pubuduwa or the Climate Resilient Integrated Water Management Project was inaugurated in

2017 for upgrading and enhancing resilience of village irrigation systems in Malwathu, Mi, and Yan Oya basins in the Anuradhapura, Kurunegala, Puttalam, Vavuniya, Polonnaruwa, Trincomalee and Mannar Districts. The other two objectives of the project were enhancing climate resilient decentralised water supply and strengthening weather climate and hydrological observing.

It was targeted to renovate around 325 village tanks affiliated to 30 cascades in river basins at a cost of Rs. 3,113 million out of the total cost estimated as Rs. 9,114 million. At the beginning, the International Green Climate Fund agreed to grant Rs. 6,664 million with the Government spending Rs. 2,450 million for the project. The Wew Gam Pubuduwa project implemented under the Mahaweli and Environment Ministry, following the change of the Government, has been affiliated to the *Wari Saubhagya* program which comes under the Irrigation Ministry. However, en-route, the main sponsor, the Green Climate Fund, has stopped pumping aid as a result of a number of technological and social issues.

According to *Wew Gam Pubuduwa Project* Director, Engineer Chandana Edirisooriya, the Government taking in to consideration the unexpected financial crisis caused by the suspension of funds by the Green Climate Fund for nearly 1.5 years now, has been feeding the project with adequate funds, avoiding any delay in carrying on with the *Wew Gam Pubuduwa Ellanga* restoration program.

This shows if people have determination and dedication, they can implement any development project without depending on foreign loans or grants. Under the project, 222 minor irrigation tanks belonging to 13 cascade systems and 85 village irrigation systems have been rehabilitated with 103 minor irrigation tanks to be attended for the completion of the seven districts-wide cascade development venture.

Benefits for people

The *Wew Gam Pubuduwa Project* will, once completed, directly benefit 770,500, which is nearly 70 percent of the vulnerable population in the seven districts or the people in the three river basins. The project will indirectly benefit about 1,179,000 more people, and together, the total beneficiaries accounting for 57 percent of the population of the seven districts. The number of beneficiaries, the majority of them are farmer families, consists of 9.6 percent of the country's population.

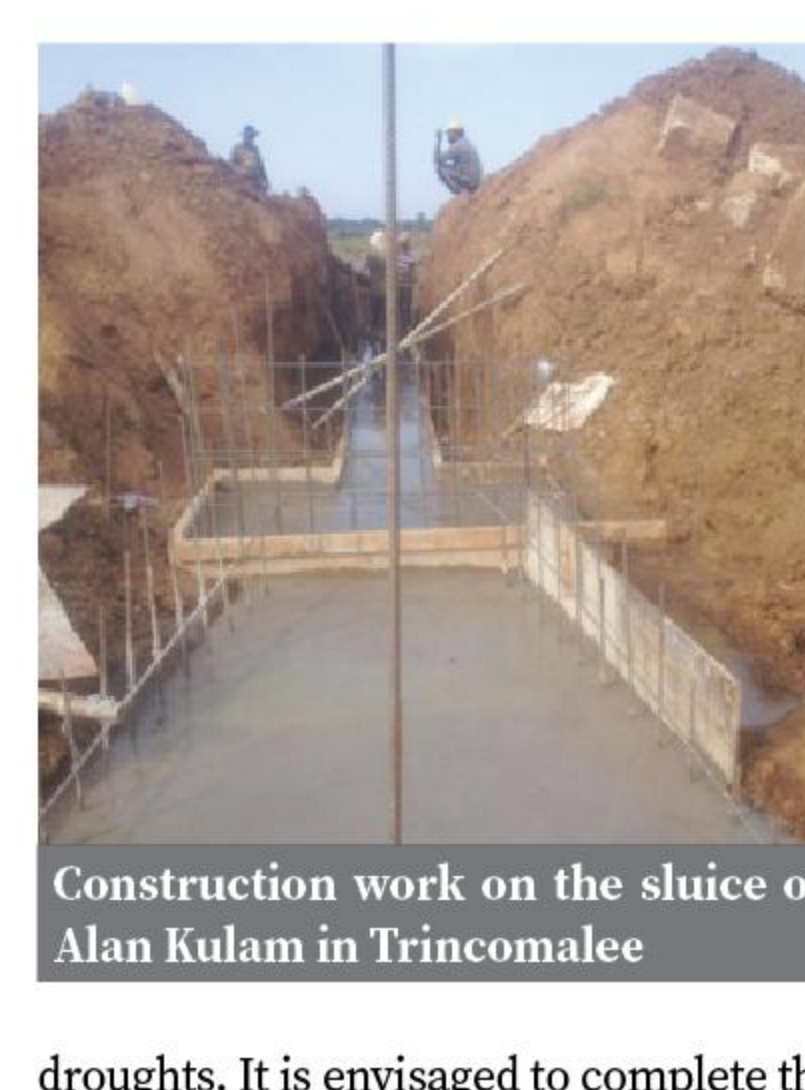
There is another cascade system development project implemented in the North Central Province. On the instructions of former President Maithripala Sirisena, the program was inaugurated in November 2018 at the Nabadagaswewa tank after the country's cascade system was declared an agricultural world heritage by the United Nations.

It was targeted to renovate 17 tanks which come under the Dunumadalawa tank cascade and the Ambagahawewa tank cascade in the Mahawilachchiya and Nochchiyagama Divisional Secretariat Divisions. The Sri Lanka Army contributed for the rehabilitation works. It was found that there were several tanks not repaired for around five centuries in these cascades.

It is appropriate to refer to the development of the Maha Kirindagama cascade beneath the Katupotha hill in Mihintale, Anuradhapura. The cascade comprises 15 tanks, under which, around 870 acres are cultivated by 438 farmer families.

The capacity of the Maha Kirindagama tank has reduced due to its silting. Over the past few decades, the rehabilitation and improvement of minor irrigation systems have been accorded less priority. One of the main objectives of the rehabilitation work is to enhance reservoir capacity by removing deposited sediments from the tank bed without disturbing the sensitive areas of the tank and reinstate the tank bed to increase the water capacity. Since it has been the longstanding request of the farmers, the desilting of the tank bed started without any cost to the Government as a pilot project.

Irrigation experts said those engaged in rehabilitating tanks should be careful in handling heavy equipment and machinery not to damage the interior solid clay layer in the bottom of the tank and to pierce no more than three feet from the surface of the tank bottom to rake out the deposit of sediment.



Construction work on the sluice of Alan Kulam in Trincomalee

The village tank systems rehabilitated under Wew Gam Pubuduwa

Name of the cascade	No of tanks rehabilitated	Apura	Vavuniya	Kurunegala	Trincomalee	Puttalam
Bandarapuliyankulama	11					
Sivalakulama	20	20				
Mathavuvaitakulama	14		14			
	10	10				
Medderambewa	25					25
Thuduwakailulam	38	11	27			
Mamunugama	08			08		
Anguruwella	11			11		
2021						
Aluthhalmillewa	21	21				
Rathmale	04	04				
Kadawala	24		14	16		08
Ethabendiwewa	21	10			21	
Kumbukwewa	15				15	
Total	222					