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The Island Editorial ANALYSIS COMMENTARY

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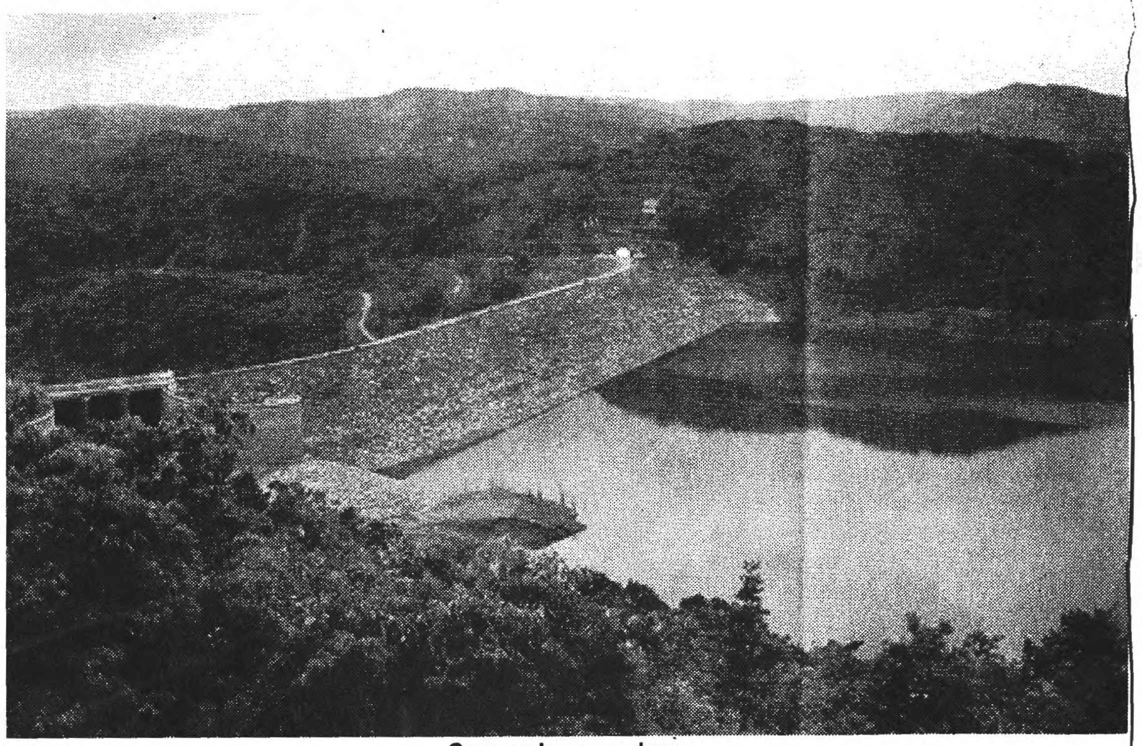
In a newspaper article, Minister Patali Champika Ranawaka has described Samanalawewa leak as a serious engineering blunder in Sri Lankan history. However, this leak provides a continuous supply of water to a downstream community dependent on agriculture for centuries and for the, the leak is indeed a blessing.



Samanalawewa dam

Samanalawewa leak – Engineering blunder or a blessing?

The reservoir and the power plant

Samanalawewa is a reservoir built during 1986-91 across the Walawe Ganga flowing to the south of the central hills in Sri Lanka. It starts at an elevation of about 7,800 m on the southern wall of the Adam's Peak range (not from the Peak) to the southern coast traversing a distance of 138 km and discharging an annual average volume of 2,200 Mm^3. It is the fourth largest river in the country in terms of volume discharged and has a catchment of 2,456 km2 served mostly by the two inter-monsoonal rains peaking in April and November. The annual average river flow at site is 18 m3/sec and the minimum flow recorded is 3.5 m3/sec.

Samanalawewa is the second reservoir built across Walawe, the first being the Uda Walawe Reservoir built in 1965 for the purpose of 'developing' the southern plains which was at that time covered with virgin jungle. With the availability of irrigated water, the region is now converted into paddy fields and cash-crop plantations such as sugar cane and banana with corresponding growth of new settlements.

The southern plains of the country rises to an elevation of about 100 m gradually and then within a matter of a kilometre rises to over 400 m elevation forming the southern wall. The upper region terrain is steeply hilly and undulated, and Walawe and its main tributary Belihul Oya flow along deep valleys in it. The two waterways, after their confluence, cascade down to the lower plains within a short distance. Walawe is damned just below the confluence forming the Samanalawewa. Flowing along the lower elevation is Katupath Oya which joins Walawe after merging with another tributary Diyawini Oya. At one location, Katupath Oya flows only a short distance away from Walawe but more than 300 m below. Water from the reservoir is taken down this height difference into Katupath Oya through a power plant driving a generator with installed capacity of 120 MW. The power plant was initially estimated to generate 460 GWh of electricity annually, which was about 15% of the total hydro energy output in 1990.

Early studies

The potential of Walawe to generate hydro-electricity was known to Sri Lankan engineers even in the fifties. According to a news item in *The Island* of 05.06.2000, the original proposal for this project was made by American consultants in 1966, and later revised by Australians in 1973. Thereafter, British and Swiss consultants were engaged in the project. In late seventies, a feasibility study including detailed design and some preparatory works was carried out by Russian consultants and a local agency. However, the government awarded the contract for implementing the project to Japanese and British companies in mid-eighties. Changes in government appeared to have resulted in changes in consultants.

In the article by Minister Ranawaka referred to above, he says that "the Russian scientists, who carried out pre-feasibility work in the 1970s, concluded that the area was of Karstic cave type geological formation". Karst is a land form that is formed primarily by dissolution of carbonate rocks such as limestone, dolomite, marble, gypsum and salt. Features of karst landscape include sinkholes, caves, sinking streams and large springs. In simple language, karst land can be described as a honey comb.

Construction without investigations

The Minister further says "to ascertain the existence of such a geological formation, they (Russians) suggested that a service tunnel be constructed first, through the right bank, if at all we were to go ahead with the construction of the dam. However, when the Japanese firm undertook the construction work, it opted to ignore the conclusions of the Russian scientists. No doubt, it will remain a serious historical engineering lapse, on the part of the then policy makers associated with the project".

This is not the only occasion when the Japanese took over projects on which initial studies had been done by others. Also in the eighties, the German Agency GTZ had developed a master plan for the electricity supply in Sri Lanka, but before the government could implement it, the Japanese came and offered funds to develop a project to generate electricity after tapping water from five waterways in the hill country drying up several waterfalls. A modified version was implemented after much controversy. The GTZ plan is not spoken about now. In the meantime, another master plan for the power sector was developed by the Japanese Agency JICA together with CEB in 2006.

It is not clear why the contract with the Russians was terminated prematurely and given to consultants from Japan and UK. It could be that Japan had agreed to provide funding which was not forthcoming from the Russians. Still, that is no reason for putting aside the findings of the Russians. It is also not clear why the local authorities remained silent when Japanese had their way. After all, the final decision should have been made by the local authority, the owner of the project. Had the government taken the correct decision at that stage to undertake further studies on the sub-surface structure before commencing work on the project, the disaster to follow could have been averted.

The dam and the leak

According to various reports on the project available on the Internet, the development of the project could be traced and information about it sourced. The construction work of the dam was started in year 1986 and the main work was completed in 1991. The dam was rock filled 100 m high and 530 m long. The total storage capacity is 218 Mm^3, with 60 Mm^3 of dead storage. The design maximum water level is 460 m amsl. The water is taken along a 5.1 km long low-pressure tunnel and 840 m high-pressure penstocks feeding the turbines.

The initial impounding of the reservoir commenced in June 1991. However, when the water level was only 16 m deep, a leakage appeared as a small spring in the right bank about 300 m downstream of the dam. The impounding was stopped at that time and all the experts would have put their heads together to find out what had gone wrong. After carrying out many investigations, the potential leakage paths were thought to be along the karstic rock units and through major faults existing in the right bank. Thus a 1,315 m long and 100 m deep grout curtain cutting across the fault zones and running into the right bank was constructed. The grout curtain consumed 13,450 tons of cement and involved 53,600 m of drilling for grouting.

On completion of the right bank grout curtain construction, the official impounding of the reservoir was commenced in March 1992. However, impounding could not be continued because of a sudden burst in the right bank in October 1992, washing away of large portion of the right bank downstream face. The impounding was suspended and the reservoir water level was maintained 30 m below the maximum reservoir water level until the remedial measures were decided.

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