

IRRIGATION DEVELOPMENT AND UNDERDEVELOPMENT IN SOUTHERN SRI LANKA

by D. L. O. Mendis

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Ancient Ruhuna

According to the University History of Ceylon (UHC) :

"Rohana-desa or Rohana-mandala (S. Ruhunu-danaviya) and Malayadesa or Malaya-mandala (S. Manamandulu) were two territorial divisions which are mentioned from the earliest times. Rohana comprised all the area to the east of the Mahaweli ganga, together with lower Uva and the Hambantota, Matara and Galle districts, and its capital was at Mahagama (present Tissamaharama), while Malaya extended over the entire mountain region and its foothills. Rajaratha, although not specifically mentioned in the chronicles till the ninth century, was the first of the three principalities, the original but circumscribed realms of the early kings who reigned at Anuradhapura until Dutthagamani Abhaya in B. C. 161 united the whole island into one kingdom....

Economically, Rohana was a much less prosperous territory than Rajaratha, and the remains of its capital Mahagama, bear no comparison with those of Anuradhapura or Pollannaru"..... (U. H. C. Vol 1, Part 1, 12-13).

The irrigation works in ancient Rajaratha included a complex system of interconnected large reservoirs and channels, developed between about the 3rd

century B. C. and the 12th century A. C. Brohier described these in a historic paper to the Royal Asiatic Society in 1935, titled: "Inter-relation of Groups of Large Reservoirs and Channels in the Rajarata" (Brohier, 1937). A very large number of small village tanks had also been built, each tank most probably representing a small village settlement, like present day Pul Eliya. (Leach, 1961)

Small village tanks

In ancient Rohana, the dominant feature was the systems of small village tanks, one feeding into the next after commanding its tract of fields, in what is described as a cascade. Large reser-

voirs and channels had not been developed on the same grand scale as in the ancient Rajaratha. In the Walawe ganga basin a diversion channel had been built to lead water from the main river along its left bank, apparently to augment a large reservoir variously called Urisitawewa, Pandikulama and Magama weva. (Fig. 1) Other river diversion irrigation systems had been built in the Kirindi oya, Menik ganga, and Kumbukkan oya basins for example. What may be described as medium-scale reservoirs had been built around the ancient capital Mahagama. These are the present day Wirawila weva, Tissa weva, and Yoda weva. (Fig. 2)

The cascades of small village tanks merit attention. There is reference to as many as 20,000 small village settlements in the Culavamsa. Geiger says:

"We are inclined to infer from the names Dvadasasahasaka-ratha and Athasahasaka-dasa which can be translated only as 'province of the twelve thousand (eight thousand) settlements or fields' that Rohana was intensively cultivated and of extraordinary prosperity in the 12th century.." (Geiger, 1960, 11)

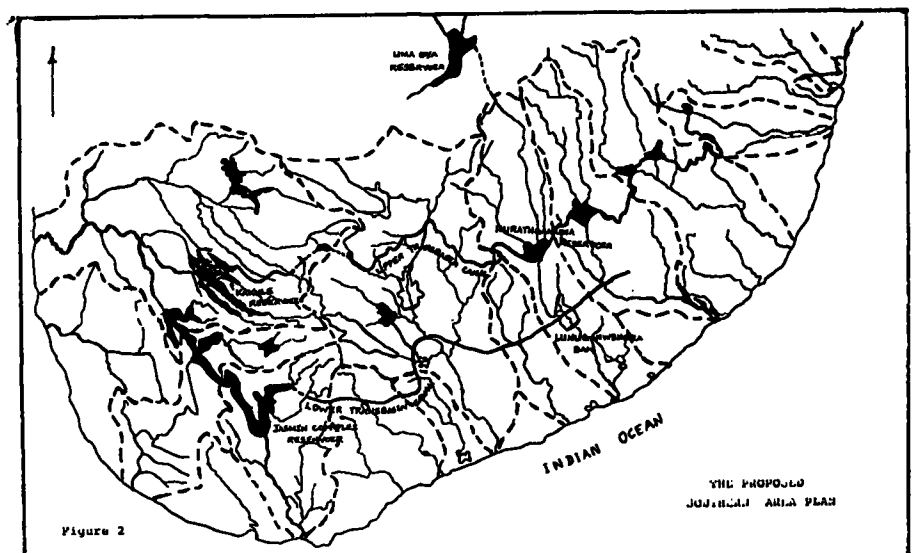


Figure 2

The remains of these small village tanks are evident to this day. They are shown on the one mile to an inch topographical survey sheets, described as 'abandoned' or 'working' as the case may be.

In the Rajarattha in 1923, following cyclonic rains, a cascade of these small tanks breached, one breach triggering off another in the chain, and the resultant flood washed away the railway embankment near Medawachchiya, with much loss of life and damage to property.

Up to that time, the Irrigation Department (which had been set up in 1900 by hiving off a branch of the Public Works Department), was more concerned with the major ancient irrigation works which had understandably excited the interest of the colonial engineers, on account of their sheer magnitude and complexity. However, a systematic study of the minor irrigation works was now undertaken, by the Irrigation department, even though they actually came under the administrative authority of the Government Agents. Ten years later, J. S. Kennedy, then Deputy Director, and later a famous Director of Irrigation, published his landmark paper: "Evolution of Scientific Development of Village Irrigation Works in Ceylon". This was to be republished and used as a Handbook in the Irrigation Department for the next 25 years, until it was superceded by Arumugam's Handbook.

In that paper presented to the Engineering Association of Ceylon, Kennedy made a statement which was to have far-reaching consequences. He said, *inter alia*:

"The small village tanks, like the village cattle, are far too numerous for efficiency". (Kennedy, 1934, 132)

This observation was to be interpreted by irrigation engineers in the years ahead to mean that the small village tank was a stage in the evolution and development of irrigation tanks, and by inference, should be replaced by a large storage reservoir wherever and whenever possible. However, the only evidence available to support this view is the above-mentioned Magama weva in the Walawe basin. (Fig. 1) Brohier him-

self quotes a 'local tradition' that this ancient tank had 'held the waters of a thousand tanks' and states that some 440 small village tanks had been found in its catchment area in modern times. (Brohier, 1934)

Brohier's theory

In his Presidential Address to the 50th Jubilee Sessions of the Engineering Association of Ceylon in 1956, when it became the Institution of Engineers of Ceylon by Royal Charter, Brohier added the not inconsiderable weight of his own authority to this erroneous view which at that time was the prevailing dogma in the Irrigation department. Brohier said that the ancient irrigation works in Ceylon had evolved in four stages, as follows:

1. Rain-fed tanks from which water was baled out at leisure,
2. Small village tanks,
3. Large storage reservoirs, each of which submerged a number of small village tanks,
4. A diversion weir built across a flowing river, and leading water by means of a diversion channel, to augment a large storage reservoir.

In December 1957, a little more than a year later, after unprecedented cyclonic storms in the dry zone, all the major ancient reservoirs were breached within the short space of about two weeks, and their beds were exposed to view. There was no evidence that small village tanks had been submerged when any of them had been built. Unfortunately, however, this most significant fact went unremarked at the time. Its importance was to be realised only much later.

Water Resources Development Map of Ceylon

In 1959, a map described as the Water Resources Development Map of Ceylon was published by the Surveyor-General. Work on this map had apparently been going on in the Irrigation department in the fifties, and suitable sites for large reservoirs were being identified in major river basins. The basis for this identification was a within-basin or single-basin balance of land and water resources, without considering any possibility of trans-basin diversion.

The earliest large-scale trans-basin diversion in this country had been the construction of the Jaya ganga to lead the waters of the Kala oya to the city tanks of the ancient capital Anuradhapura standing on the banks of the Malwatu oya, the adjacent river basin. The 54 1/2 mile long Jaya ganga was built no later than the 5th century, possibly much earlier. Thus, the 1959 Map of Water Resources Development, based on the restricted concept of within basin development without any trans-basin diversion, set the clock back at least 1500 years.

Incredible as this may sound, it is even more difficult to believe that this map is still being used as the basis for identifying every new large scale irrigation project in the country! This has been discussed at a number of meetings in the Institution of Engineers, Sri Lanka, where it was recently described in a critical paper as being 'unscientific and irrational' (Transactions 1, 1989, 34). Nevertheless a copy of this map hangs in the office of every high-level decision-maker in the field of irrigation, from the Minister to the Secretary, from the Director of Irrigation to the Director-General of Mahaweli, and so on.

The first large reservoir to be built as shown on this map was the Chandrika weva, constructed in 1963. This medium scale reservoir is located across the Hulanda oya, a branch of the Walawe ganga, and its design parameters had apparently been pulled out of a hat. It's crowning 'justification' appears to have been that it was named after the then Prime Minister's younger daughter, (who was too young at that time to have been consulted.)

Uda Walawe reservoir

Later, the Uda Walawe reservoir was built at Timbolketiya. The question of the wrong location of this gigantic reservoir was first discussed in a paper presented to the Institution of Engineers, in 1968. It was pointed out in that paper that the basic principles of water resources development planning had not been followed in 'planning' Uda Walawe. These principles as discussed at that presentation, are:

1. Define the purpose of the engineering project. Formulate its useful end which makes the creation of the project a desirable objective.

2. Plan the project in accordance with its established purpose. Investigate alternative proposals, and select the project that will most effectively fulfill the purpose.

3. Design the project in the most efficient manner and in accordance with appropriate criteria of safety.

4. Construct the project according to its design, while applying suitable standards of workmanship.

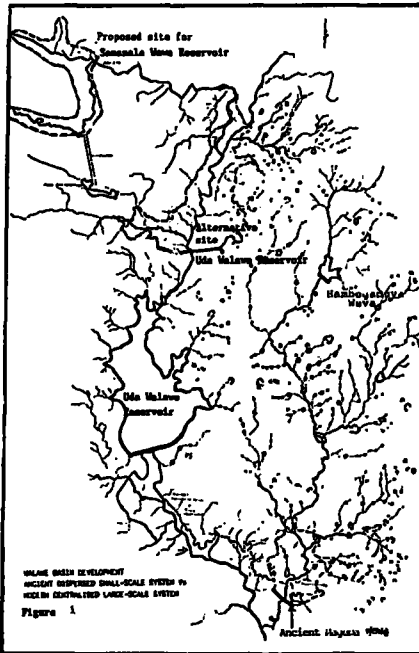
5. Operate the project, thus bringing the useful end of the engineering plan into concrete existence.

(Kuiper, 1965, quoted in Transactions, I, 1968, 134)

It was argued that the correct location of the Uda Walawe reservoir should have been determined by the application of these and other similar principles. If this had been done, it was further argued, the correct location would have been found to be a site about ten miles upstream of the present Uda Walawe headworks. (Fig. 1, from Transactions, I, 1968, 134):

"This reservoir could have functioned as an afterbay reservoir for the Samanala weva. Spillway could have been provided in a gap between hills as shown. The cost of the reservoir should therefore have been less than the cost of the reservoir already constructed". (Ibid, 135)

The late Mr. H. de S. Manamperi, an Engineer-Manager of the first rank in excellence, took strong exception to these views when they were presented in 1968. (Transactions, II, 1968, 118-120). However, a few years later he had the courage to make a statement at the Development Secretaries' conference in the Ministry of Planning and Economic Affairs, that he was now convinced that small tanks should not be submerged by construction of large reservoirs. This was when top Administrators were discussing the possibilities



for creating new employment opportunities in the agricultural sector by restoring some of the small village tanks, at a time when employment creation was given highest priority after the attempted insurrection in 1971. Later still, Mr Manamperi, as Chairman of Mahaweli, directed the foreign Consultants that as many as possible of the small tanks should be incorporated into the new Blocking out plans for Mahaweli.

Southern Area Plan

Amongst the large reservoirs identified on the 1959 map were three large reservoirs in the southwest wet zone, in the basins of the Kalu ganga tributary the Kukule ganga, the Gin ganga and the Nilwala ganga. Above a certain elevation these three separate reservoirs have a common water spread, and this single very large reservoir was called the Jasmine Complex. Foreign consultants were engaged by the Irrigation Department to report on this proposal which was then called the Three Basins project.

The foreign consultants, in their report recommended that further studies should be done on the possibility of diverting excess water from the southwest wet zone to the southeast dry zone, for irrigation. The possibility of hydropower development was not excluded.

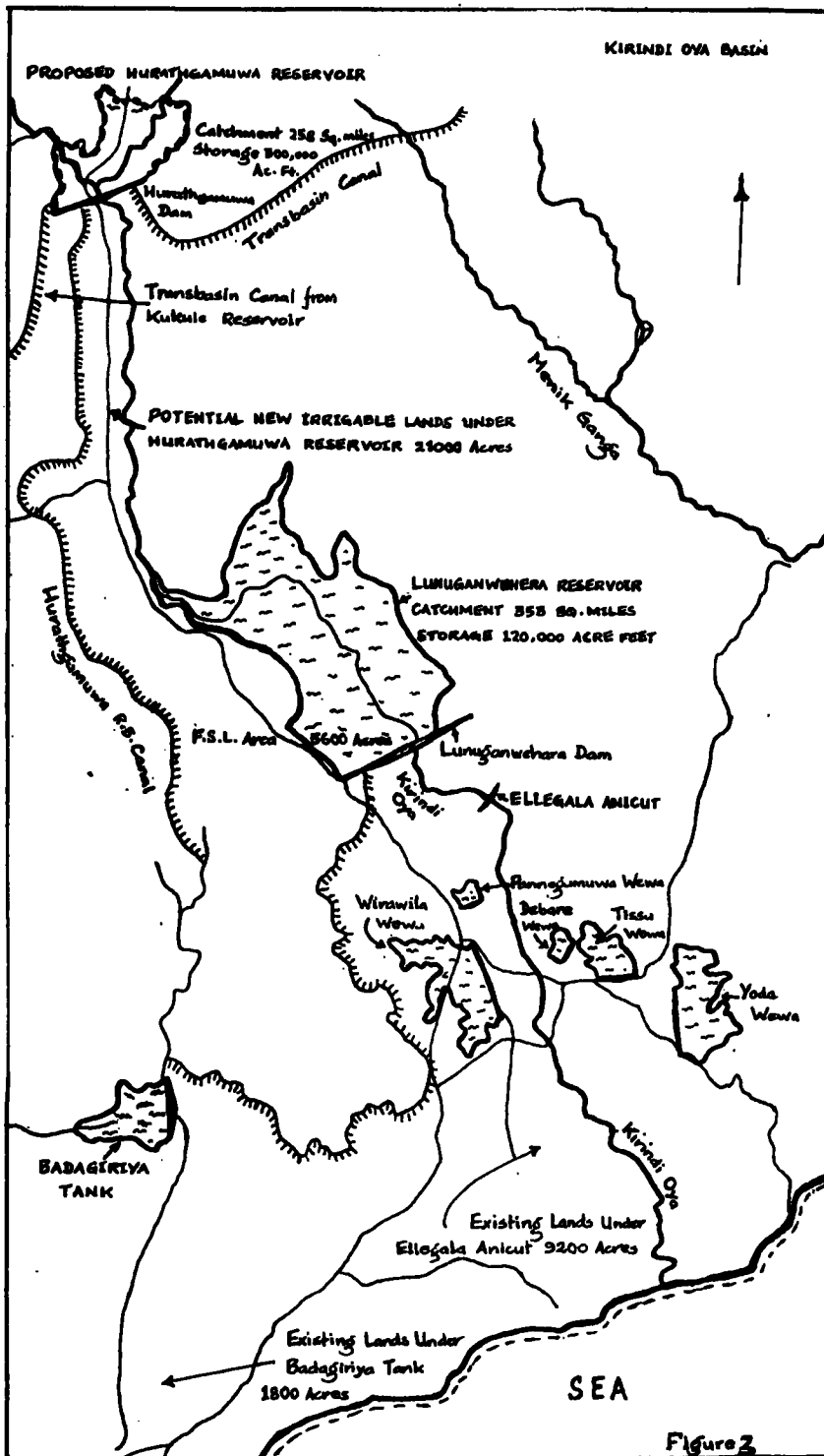
This idea was taken up by Mr M. S. M. de Silva, then General Manager, Ceylon

Development Engineering Co. Ltd. who with assistance from Mr Roy Peiris, Drawing Office Assistant, prepared the first outline of the Southern Area Plan, in the mid-sixties. (Fig. 3).

The Southern Area Plan was essentially a proposal which envisaged the diversion of excess water from the southwest wet zone to the southeast dry zone by means of two transbasin diversion channels running from west to east. Medium-scale reservoirs were to be built at successive crossings with the south flowing rivers encountered by the Upper Trans-basin channel. The proposal was shown on the one mile to an inch topographical survey sheets. At this stage it was clearly seen that the Uda Walawe reservoir, lying as it does between the traces of the two transbasin channels, was indeed wrongly sited. It should have been located about ten miles upstream of its present location, at the intersection of the Upper transbasin channel with the Walawe ganga, near the existing ancient Ukgal Kaltota anicut. (Fig. 3)

This concept of the Southern Area Plan, shown on the topographical survey sheets was introduced to the Ministry of Planning and Economic Affairs in December 1969, and displayed on the panels of the National Operations Room. It was officially brought to the notice of the Director of Irrigation thereafter. It was also introduced to a wider audience of professional engineers in the Institution of Engineers, in October 1971, in a paper presented to that Institution. (Transactions, I, 1971). At about this time, national planners were asked by Prime Minister Sirima Bandaranaike to come up with employment generating projects, to appease frustrated unemployed youth. The Southern Area Plan was then brought to her personal attention.

Unknown to the national planners, Mrs Bandaranaike had taken a bundle of topographical survey sheets with her on an official visit to China shortly after. In China, she had been given an opportunity to discuss the plan with the Chinese Vice-Minister for Irrigation, Madam Chien Chen Ying, a heroine of the Long March. The Vice-Minister herself later led a team of engineers to Sri Lanka in connection with the project. However,



after the Director of Irrigation and some of his engineers had visited China, a proposal described as flood protection in the Gin ganga basin and the Nilwala ganga basin, was identified for further investigation, and implementation with technical assistance from China. The larger concept of the Southern Area Plan, and development of the southeast dry zone (SEDZ), starting with restoration of a selected number of ancient small village tanks, was lost sight of.

Lunugamvehera

Also in the seventies, specific directions were given by the Ministry of Planning and Economic Affairs that any future project in the SEDZ should fit into the larger, long term concept of the Southern Area Plan. However, in the course of time these well-meant directions came to be ignored. In particular, a request to undertake investigations for a medium-scale or large reservoir at a

place called Huratgamuwa, the site of the intersection of the Upper Transbasin channel with the Kirindi oya was not acted upon by the Irrigation department. Instead, investigations were undertaken by the department for construction of the Lunugamvehera weva, or lower Kirindi oya reservoir shown on the 1959 map. This large reservoir would submerge a number of small village works, and thus conformed to the third stage of Brohier's 4 stage theory, described previously. This may have been the reason why successive Directors of Irrigation blindly pursued the Lunugamvehera proposal, through all the stages of investigation, and finally took it up for construction, at great cost with foreign funding, without ever investigating Huratgamuwa.

In ignoring the directions given by the Prime Minister's Ministry of Planning and Economic Affairs, the Ministry of Irrigation (aided and abetted no doubt by the Irrigation department), violated not only the basic tenets of inter-Ministerial discipline and collective Cabinet responsibility, but also totally disregarded one of the first principles of water resources development planning (or any national planning for that matter), that at the pre-feasibility stage, if not later, alternative proposals must be investigated.

When the new government came into power with an unprecedented 5/6ths majority in July 1977, the bureaucracy and technocracy had no doubt done their share to discredit the outgoing government. Many individuals in this same bureaucracy and technocracy were now alerted to prove their 'loyalty' to the new regime, and pick up the appropriate rewards that would inevitably result.

Huratgamuwa

Mr M. S. M. de Silva who was Technical Adviser, and this author who was Adviser (Techniques) in the Ministry of Planning and Economic Affairs, concerned with the cavalier treatment meted out to the proposed Southern Area Plan by the Irrigation department and Ministry, submitted a fresh memorandum to the new Minister for Irrigation Mr Gamini Dissanayake. This memorandum explained the advantages of the Huratgamuwa site over Lunugamvehera, and stressed the absence of any scien-

tific or rational basis, in terms of the principles of water resources development planning, for Lunugamvehera.

The new Minister, who at that time could not have been expected to have a proper appreciation of the conflicting technical issues, appointed a five member Committee of engineers to report to him. The Committee consisted of Messers A. Maheswaran (Chairman), D. Ladduwahetty, T. Palamakumbura, M. S. M. de Silva and D. L. O. Mendis. Messers Maheswaran, Ladduwahetty and Palamakumbura submitted a Report recommending that Lunugamvehera weva should be taken up for construction immediately because investigations had been completed, and if the Huratgamuva site was to be investigated at that stage, there would be a delay.

It should be noted that this recommendation contains an assumption that the Huratgamuva site could not give better benefits than Lunugamvehera, and that the Lunugamvehera site did not have any intrinsic shortcomings that Huratgamuva would be free of. This is a big and bold assumption for any engineer to make without subjecting the alternative site to investigations.

On a later occasion the Minister said that in taking the decision to go ahead with construction of Lunugamvehera, he had been guided by a dictum of Napoleon that a general could afford to lose a battle, or even a war, but not to lose time. The only justification for taking up Lunugamvehera for construction then, was that there would be a delay if Huratgamuva was to be taken up for investigation.

That was in late 1977. It is instructive to note here that full investigations for Huratgamuve would have taken between 6 months and one year, under normal conditions. Investigations could possibly have been 'accelerated' and completed in 3 or 4 months.

In the event, for various reasons construction of Lunugamvehera did not begin till late 1978. The estimated time for construction at that time was 4 years. However, for various reasons construction actually took double that time and

was completed only in 1986. Meanwhile cost of construction also escalated wildly, and it was said that the original estimate ultimately increased by a factor of four when all claims were added up after completion. And, the Huratgamuva site was never investigated.

Discussions at the Institution of Engineers: Red herrings

A paper was presented at the Institution of Engineers in October 1977 which discussed in some detail the pros and cons of this issue and also some other related issues arising from technology transfer for irrigation and multi-purpose development projects in Sri Lanka. (Transactions, 1977.) Unfortunately, the Southern Area plan and allied subjects could not be adequately discussed because red herrings were raised by a high level technocrat who obviously wanted to see the Lunugamvehera project implemented at any cost, and did not want even a preliminary investigation of the Huratgamuva site. Some of these red herrings were an assertion that 'the present government was not prepared to wait 30 years for the entire Mahaweli development and they wanted to develop 900,000 acres in 5 years'; another statement that 'it certainly was a good idea to divert water from the wet zone to the dry zone and this in fact was being done in the Mahaweli project'; and finally, the *piece de resistance*: 'if the government decides to stop the Mahaweli project and go to the southern area (they) would have to do so'! (Transactions, 1978, 75, quoted in Transactions, 1989, I, 41)

Not surprisingly, this technocrat moved from high to higher office, and five years later pontificated in the following terms at a Seminar held in the Institution: "In his opinion the question of further projects after the present Mahaweli programme is completed may not arise. For one thing the land will not be there for such purposes, and secondly the required national food and other agricultural products from irrigated cultivation would all be grown within the projects that have already been taken up". (Transactions I, 1983, 150). In other words, **the proposed Southern Area Plan could not, and need not be investigated and implemented.**

Blood on our hands

These and other discussions at the Institution of Engineers have shown how technocrats in high office can mislead politicians: "Construction of Lunugamvehera was manoeuvred by shortsighted technocrats who did not investigate the Huratgamuva alternative, and virtually forced the Minister into giving his approval for a defective proposal, 'to save time'". (Transactions, 1989, I, 42-43)

For these reasons it has been argued that: "there is a direct link between the anarchy that disrupted the alienation of land in Walawe in the early seventies, and the widespread unrest and civil commotion that has erupted in the south in more recent times.....when innocent civilians are 'caught in the crossfire' as reported in the press from time to time, some of the blood of these innocents must lie on the hands of technocrats responsible for destruction and destabilisation of ancient irrigation ecosystems". (Transactions, 1989, I, 43).

Irrigation ecosystems

Brohier's 4 stage theory for the evolution and development of irrigation systems was re-published by Professor Joseph Needham in Volume 4, Part 3, of his great work, *Science and Civilization in China*, in 1971. (See Box).

An alternative 7 stage theory was proposed in 1984, which Professor Needham has more or less accepted, and has requested this author to revise that portion of his Volume 4, Part 3, in terms of the new theory. The 7 stages are: (Mendis, 1989, 12)

1. Rain-fed agriculture.
2. Seasonal river diversion and inundation irrigation.
3. Permanent river diversion and development of channel systems.
4. Construction and operation of weirs and spillways on diversion channels.
5. Invention of the sluice (sorowwa) with its access tower (bisokotuwa).
6. Construction of small, medium and

Extract from Vol. 4 Part III Page 369 of Professor Joseph Needham's Science and Civilization in China. Prof. Needham has stated "my treatment of the subject can be improved upon and I am counting on you to do it."

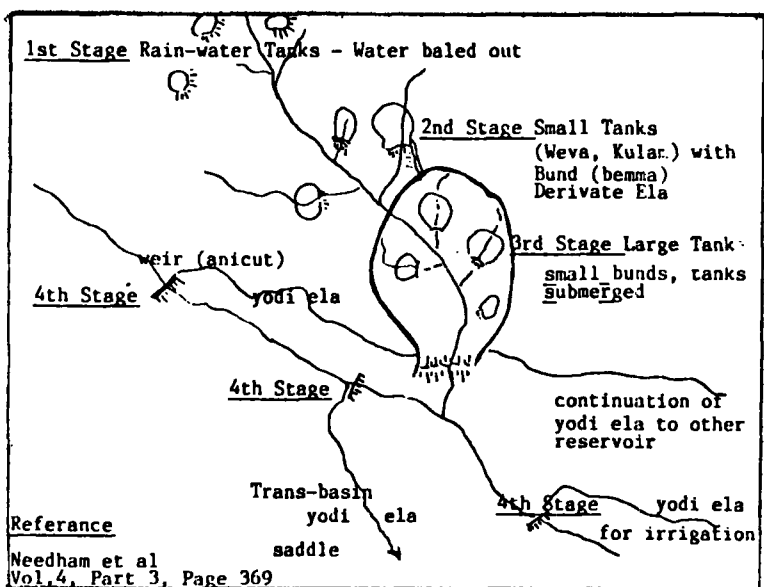
Brohier's Theory, quoted by Needham

The process of evolution which is thought to have occurred may be described as follows:

First the farmers made numerous small tanks in the hills and foot-hills, near their fields or terraces to catch the run-off water they baled out at leisure. Then numbers of small dams, bunds (bemmas) were built, often in series, on the upper reaches of tributaries of the greater rivers, thus retaining the annual or inundatory flow and discharging it as desired by small canals (ela) along the valley sides. As time went on larger dams were built submerging or rendering unnecessary the smaller ones. The next step was revolutionary: a weir (anicut, Tamil=tekkam) was built much higher up the main river (ganga, oya, Tamil=aru)

to form the headworks for a long lateral water course to join the annual monsoon supplies in the great reservoir. This method ambitious as well as scientific, had numerous advantages:

- a. It harnessed a greater volume of water than any local catchment areas could yield.
- b. It put both monsoons as well as other rainfall to full use.
- c. It secured a resource in drought periods as well as an even supply in normal years, and
- d. It lessened the silt accumulation problem because the feeder canals could be cleared periodically much more easily than the tanks (Needham et al, 1971, 368)



large storage reservoirs, equipped with the sorowwa with bisokotuwa.

7. Damming a perennial river.

Arising from this 7 stage hypothesis, the concept of irrigation ecosystems was born, which makes it possible to really understand and appreciate the ancient irrigation works from a scientific perspective. The following ecosystems have been identified in Sri Lanka:

1. Rain-fed seasonal agriculture or haen govithan (as described by Ray Wijewardena), and rain-fed perennial tree crops.
2. Seasonal cultivation under inundation or flood irrigation.
3. Seasonal cultivation under river diversion and channel irrigation.
4. Seasonal cultivation under irrigation from small village tanks.
5. Two seasons per year cultivation under irrigation from a large storage reservoir commanding several micro irrigation ecosystems of types 2, 3, and 4, forming a macro irrigation ecosystem.
6. Two seasons per year cultivation under inter-connected macro irrigation ecosystems forming a complex of macro irrigation ecosystems of the type seen in the ancient Rajaraththa. (Ibid, 12)

Leach's Hydraulic Society in ancient Ceylon

Although Brohier first drew attention to the 'inter-relation of groups of large reservoirs and channels in the ancient Rajaraththa' even he failed to recognize the essential interdependence of the small village tanks or micro irrigation ecosystems and the large works which formed macro irrigation ecosystems. Leach, in his otherwise excellent essay on 'Hydraulic Society in Ceylon' (Leach, 1959), somewhat rashly rushed to wrong conclusions regarding small village tanks and large storage reservoirs when he asserted:

"But in Ceylon, although the major irrigation works provided food for labourers

as well as amenities for palaces, the hydraulic system was not of crucial economic significance for the society as a whole. When the central government was disrupted, and the major works fell into disrepair, village life could carry on quite adequately, for each village still possessed its own small – scale irrigation systems which was maintained by the villages themselves". (Leach, 1959, 23)

This statement overlooks or misses the vital inter-dependence of 'major irrigation works' and 'small-scale irrigation systems'.

The following sweeping conclusion is even more obviously in error:

"The major hydraulic works are not created rationally and systematically but haphazard as pieces of self-advertisement by individual leaders. But once started, such constructions survive and can be enhanced by later adventurers of the same type'. (Ibid, 24)

Anyone who understands the functional concept of micro and macro irrigation ecosystems, especially the functioning of the complex of macro irrigation ecosystems in the Rajaratha, will surely disagree with Leach. From an irrigation ecosystems perspective, the major hydraulic works referred to have indeed been created both rationally and systematically, and that too over an extraordinarily long period of time running to several centuries.

If any major works in Sri Lanka can be described as having been "not created rationally and systematically but haphazard", surely Uda Walawe and Lunugamvehera qualify perfectly? As to whether they were built 'as pieces of self-advertisement by individual leaders', the cap seems to fit technocrats and bureaucrats rather than political leaders (strangely enough).

Irrigation problems in Southern Sri Lanka today

In ancient Rohana, as we have seen already, there was a preponderance of micro irrigation ecosystems, whereas in ancient Rajaratha there was a complex of macro irrigation ecosystems. The

chains of small village tanks seen on the topographical survey sheets for Timbolketiya, and Kataragama, in the Walawe ganga, Kirindi oya, Menikganga, and Kumbukkan oya basins, has always been a subject of interest even something of an enigma, to modern engineers.

Very recently, studies done by Dr Kapila Gunasekera of the Post graduate Institute of Agriculture have shown that a cascade of small tanks could function efficiently if augmented by a medium-scale tank situated up stream of the cascade or cascades. Hambegamuwa weva in the upper Mau ara basin (a large tributary of the Walawe) was the example used. (Fig.1) (Gunasekera, 1990)

These studies offer scientific confirmation for what may intuitively seem obvious: that not all the small tanks could be filled and used for irrigation simultaneously, in a normal year. Some tanks had to be 'rested' each year, just as some fields were allowed to lie fallow. This means that a rational, scientific explanation for the existence of small tanks in such large numbers in the southern dry zone of Sri Lanka is now available.

Kennedy, unfortunately did not know this hence his famous statement quoted previously. Even more unfortunately that statement was misinterpreted by irrigation engineers - with disastrous consequences.

Misinterpretation took the form of an assumption that small village tanks should some day be replaced by large reservoirs, and this was enunciated as an (erroneous) hypothesis by Brohier in 1956. Meanwhile the Irrigation department had been working on identifying 'suitable' locations for large reservoirs without consideration of possibilities for trans-basin diversion. The so-called Water Resources Development Map of Ceylon published in 1959 was the result, and both Uda Walawe and Lunugamvehera reservoirs were built on the (false) authority of that map. *It can now be asserted that irrigation problems in southern Sri Lanka derive directly from the wrong locations of these two major reservoirs.*

Remedial measures

It follows that some drastic action is

necessary to rectify these mistakes, and not merely to offer temporary palliatives. However whatever steps are taken in the short term should be within a larger, longer term perspective plan, similar to the proposed Southern Area Plan.

Human settlements should be planned and located around selected small village tanks that will lie within the command area of the future macro irrigation ecosystem which will develop later. That part of the Upper transbasin channel between the Walawe ganga and the Kirindi oya should be constructed simultaneously. Both these projects could be undertaken under the Janasaviya program, or the decentralized budget. However, the necessary engineering planning must be done before any field work is undertaken, and this planning should be the responsibility of the Irrigation Ministry.

Other approaches to providing remedies have been proposed. For example, the International Irrigation management Institute has conducted field studies at both Uda Walawe and Lunugamvehera, since Maha 1987. Their aim seems to be to find out whether these projects are functioning satisfactorily and if not, to find out why. There also seems to be an assumption in such studies that these projects can be made to work satisfactorily, if certain additional inputs are provided. Management, especially water management is one such input that is mentioned most frequently.

Suggestions have also been made that diversion of excess water from the southwest wet zone to the southeast dry zone should be undertaken early. However, foreign consultants engaged by the Electricity Board to study the Kukule project have recommended a within-basin power project without any diversion for irrigation in the SEDZ. This may be yet another example of compartmentalisation and clash of interests between Ministries or even between departments.

Meanwhile gross and (if this is possible) increasing dis-satisfaction amongst the people in the southern area, is a socio-political reality that cannot be glossed over. Several thousands of subsistence level farmers were displaced from existing micro irrigation ecosys-

tems that had existed for centuries, when they were submerged by Lunugamvehera. These and other settlers in the downstream development area have their gravest doubts whether the promises held out to them can ever be fulfilled. To further confound these problems, frustrated settlers from the nearby Badagiriya scheme who have been experiencing water shortages virtually from the day they were settled under that project some 30 years ago, had been promised supplementary irrigation water from the Lunugamvehera weva via a 15 mile long channel traversing extremely pervious soils. These settlers know only too well that these promises are unlikely ever to be realised, whatever visiting technocrats, researchers or foreign experts may preach. John Kenneth Galbraith once described such a situation in the following words:

"Farmers rightly sense that there is danger in the counsel of any man who does not himself have to live by the results".

Some of this despair of the poor farmer in the southern area has at last filtered up to the highest levels in Colombo, and steps are now being taken to find supplementary sources of irrigation water to augment Lunugamvehera. Two schemes are under investigation: diversion from Uma oya, into the upper Kirindi oya, above the Huratgamuva site (that has still not been investigated), with incidental development of hydropower; and diversion from Menik ganga, into Lunugamvehera. *It should be apparent that diversion from Menik ganga into Lunugamvehera would amount to no more than a desperate attempt to salvage a hopeless situation by consolidating the grievous mistake that is Lunugamvehera. It should never be done.*

There may be some justification for diversion from Uma oya, after full investigations, but even at this late stage it is necessary to investigate the Huratgamuva site for a large or medium-scale reservoir.

If the investigations are favourable, government should have the courage to go ahead and build the Huratgamuva reservoir. Then Lunugamvehera weva will be breached, with absolutely no regrets, and the two billion rupees spent on it written off as sunken capital. The ancient micro irrigation ecosystems submerged by Lunugamvehera will be restored like Venus rising from the waters, and a stable new macro irrigation ecosystem will be created below the Huratgamuva weva.

What lies ahead at Lunugamvehera?

It is appropriate at this stage to reproduce an extract from a recent paper presented to the Institution of Engineers, as follows:

1. The medium-scale ancient reservoirs lying downstream of Lunugamvehera, Tissa weva, Yoda weva and Wirawila weva, are supplied with excess water perhaps due to subsurface flow from Lunugamvehera weva, and there is insufficient land below these ancient tanks to benefit from this excess water.

2. The promised supply of irrigation water from Lunugamvehera right bank channel to Badagiriya tank has not materialised. Settlers under Badagiriya who had been experiencing water shortages from the time they were first settled about 30 years ago, are now asking that they be resettled under Lunugamvehera.

3. About 1500 families who had been settled in micro ecosystems of types 1,2,3, and 4, that now lie submerged under Lunugamvehera weva, and were uprooted and resettled are now becoming something of an embarrassment to the local authorities.

4. Local people are well aware that the alternative site about 10 miles upstream of Lunugamvehera, at Huratgamuva should have been investigated, and such investigations would have taken no more than about 6 months to one year, because of easy access to the site. They also know that if it had been investigated, it would have been

much easier to build a dam at Huratgamuva than at Lunugamvehera which had various foundation problems that apparently took the engineers by surprise. Time of construction at Huratgamuva would have been about 2 or 3 years, and that reservoir would have commanded a far greater extent of irrigable land than Lunugamvehera, with re-use of water in the irrigable area.

5. Local people also know that ancient ecosystems in what is now the bed of Lunugamvehera, that had supported some 1500 families, would have been given a better assured supply of irrigation water from the Kirindi oya, after supply to the new lands settled under Huratgamuva. They well know the benefits of this type of re-use of irrigation water under ancient irrigation ecosystems, and the ancient system of irrigation and distribution of water described in this paper.

6. The destruction and destabilisation of the ancient irrigation ecosystems in the area as a result of the impact of hydraulic engineering without creating a new macro irrigation ecosystem has also had its effects on the socio-political environment in the area. Some sociologists have already reported on this aspect, but without a proper understanding of irrigation ecosystems, their reports are necessarily incomplete.

(Transactions, 1989, I, 40).

Reason d'être for this article

It is necessary to conclude this article with an explanation as to why it has been written.

The technical issues concerning irrigation development and under development in southern Sri Lanka have been under discussion at the Institution of Engineers, from time to time, ever since construction of Uda Walawe headworks with an epic river closure by a hundred percent Sri Lankan effort was achieved one year ahead of schedule in 1967. (Transactions, 1967, I, 67). Discussions during the past three years brought some

of these issues to a head. (Transactions, 1988, 1989 and 1990)

At the 1988 Annual Sessions, President J. R. Jayawardene, as Chief Guest, took special note of a paper titled: "The Need of the Hour: Non-Dependant Implementation of Southern Area Plan", which he described as a severe criticism of the policies of his government. He said that his government welcomed criticism, and that he would therefore ask the Minister in charge of Irrigation to appoint a Commission of Inquiry into the Lunugamvehera project. (Transactions, II, 1988) The 1988 paper was well received in the Institution, and also given wider publicity in the press on account of President Jayawardene's remarks. (Sunday Island, 23 October, 1988 etc.)

However, in the event, President R. Premadasa took office before a commission was appointed, and soon a new Minister in charge of Irrigation was also appointed. It became necessary therefore for a fresh report to be submitted by Mr M. S. M. de Silva and this author jointly, titled "A Plan for the Development of the Southeast Dry Zone of Sri Lanka". In response to this submission, H. E. immediately appointed a 5 man Committee headed by the Director of Irrigation to study this report and advise him. This set in motion a chain of events which culminated in the preparation of a Reconnaissance Report on the Development of the SEDZ by the Central Engineering Consultancy Bureau (CECB), in September 1989. This Report was accepted and approved by the Cabinet without amendment in November 1989.

Meanwhile, in October 1989 another paper titled: "Development of Underdevelopment in Southern Sri Lanka: Destabilisation of Ancient Irrigation Ecosystems by the Impact of Hydraulic Engineering" was presented at the Institution of Engineers, which too was well received. At this time civil unrest was building up rapidly in the south, and a correlation was seen to exist between this unrest and the maldevelopment of irrigation systems in the south in recent times, as described in this article. During discussion of this paper, it was generally agreed that this conclusion was correct.

Presently, as stated above, investiga-

tions are being carried out for diversion of water from Uma oya or Menikganga, into Lunugamvehera. It should be emphasized that investigations for the Huratgamuva site are not being done, and to all intents and purposes it looks as if that site will never be investigated.

One reason for writing this article is to place before a larger public what is thought to be an issue of national importance: the Need of the Hour to investigate Huratgamuva before trying to augment Lunugamvehera.

As we all know a great deal of blood has been spilled in the south in the recent past. The southern insurrection was not an attempt to set up a separate state, rather it was an attempt to overthrow a lawfully elected government by force of arms. Therefore it became necessary to suppress the attempt by force of arms, and presumably, this has now been done. In the process government expenditure on so-called defence spending has increased considerably. Expenditure on social welfare had already been reduced. The Physical Quality of Life Index (PQLI) that has been very high in Sri Lanka in the past, has been on a par with that in some developed countries on account of sustained social welfare measures by successive governments over a very long period of time. Future PQLI will no doubt reflect the removal and reduction of many of these social welfare measures in the recent past. The following figures meanwhile give food for thought in this context:

| % of GNP allocated : | Rice Subsidy | Military Expenditure |
|----------------------|--------------|----------------------|
| 1977 | 5 | 0.07 |
| 1987 | 0.7 | 5 |

Source: UN University, World Institute for Development Economics Research (WIDER), Helsinki, Finland.

The other reason for writing this article springs from these facts: to draw the attention of readers to some of the root causes of the disaffection in the south, which, on account of their sheer magnitude alone, cannot be resolved by cosmetic treatment, however well-meant. *Technical fixes such as the attempt to*

divert Menikganga waters to Lunugamvehera will show some favourable results in the short term, but will further aggravate an already difficult situation in the longer term. High-level decision-makers must have the courage to face this home-truth honestly, and decide to resolutely seek and find real long term solutions, rather than deceive themselves with such palliatives. Admittedly, this is no easy task in this country, where as we all know, the short term is incomparably more important for survival than the longer term, not only for (much maligned) politicians, but for insecure technocrats and bureaucrats, as well.

Fortunately however, we can all take courage from public pronouncements of H. E. President R. Premadasa, who has demonstrated a remarkable sensitivity in these matters. The following brief quotation from his address at the recent 150th Prizegiving at Royal College, Colombo, is a vivid illustration:

"Cradles of elitism and pockets of excellence may have their value. They may produce outstanding individuals. This is all well and good in its own way. But these efforts do not build an entire country. Look around at the state of our Motherland. You will see the validity of this argument. If we cannot alleviate poverty, we cannot protect prosperity. This is the warning of recent years. We neglect it at our peril". (Daily News, November 30, 1990)

H. E's Poverty Alleviation Programme, reputedly launched in the face of doubt and criticism if not downright opposition from international lending agencies, is a very brave effort to try to repair some of the ravages of the recent past. During this unfortunate period, economic growth was the goal, but not income distribution. Real Development is synonymous with development of the human being, and this means growth plus distribution on a national scale.

Economic growth alone in the recent past saw some of the rich grow unconscionably richer, and some of the poor grow desperate. Nowhere are the ravages of such skewed development (which is really only growth), more evident to the discerning eye than in maldevelopment in the long-suffering south. Underdevel-

Contd. on page 24

opment of irrigation systems as described in this article was an outstanding feature of this maldevelopment. Lunugamvehēra, which has been described as a colossal monument to technocratic folly, may also turn out to be a monument to the robber barons who were once so blithely invited to come to this country.

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