Water Resources Development Planning as Seen in the Ancient Water and Soil Conservation Ecosystems (Irrigation Systems) in Sri Lanka

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IN SRI LANKA, the pre-historic period dates back to about the 7th/8th century BC, and the proto-historic to about the 2nd/3rd century BC. The ancient irrigation works date from the proto-historic, and possibly from the pre-historic period.

The ancient irrigation works consist of river diversion systems and storage reservoirs. The former includes temporary or seasonal works, and permanent works. The latter includes small tanks and large reservoirs equipped with sluices. A special structure that has been recently recognized as a diversion structure is the small earth embankment (bund) not equipped with a sluice, large numbers of which are found in the dry zone, for example in the Mau Ara Basin in the Walawe Ganga, and shown on topographical survey sheets as "small tank (abandoned)."

A four-stage hypothesis for the evolution and development of ancient irrigation works on a hydraulic engineering basis was presented by R.L. Brohier in 1956. The hypothesis was forwarded due to the perception of the Irrigation Engineers to whom water is inanimate and passive, whereas water is seen to be animate and passive from an ecosystems perspective. This hypothesis was re-published by Joseph Needham in his classic, *Science and Civilization in China.* Needham has now recognized it as being erroneous and has invited me to revise those few pages in Volume 4, Part 3 of his great work.

This wrong hypothesis was used in the preparation of a so-called Water Resources Development Plan of Ceylon, published in 1959, in which a number of new large reservoirs have been identified on a purely hydraulic engineering basis. All the ancient irrigation works have been ignored when preparing this map, except for a few of the large storage reservoirs and channels. This map has been used for the identification and construction of new irrigation and multi-purpose development projects such as Uda Walawe and Lunugamvehera. Severe socioeconomic and agro-ecological stress has been experienced on these projects due to problems of environmental degradation, the ultimate cause of which may be traced to the hydraulic engineering perspective underlying their conceptual design.

When viewed from an ecosystems perspective, the ancient irrigation works may be correctly recognized as water and soil conservation ecosystems. Their evolution and development may then be seen to have occurred in seven stages as follows:

1. Rain-fed agriculture.

2. Seasonal or temporary river diversion and inundation irrigation.

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3. Permanent river diversion and channel irrigation.

4. Construction of weirs and spillways on contour channels.

5. Invention of the sluice (*sorowwa*) fitted with its access tower (*bisokotuwa*).

6. Construction of storage reservoirs equipped with sluices.

7. Damming of a perennial river.

The seven-stage hypothesis may be used to understand how the ancient systems evolved down the ages, using Brohier's well known documentation in his 3 volumes, titled *Ancient Irrigation Works in Ceylon,* and in his paper, titled "Inter-Relation of Groups of Ancient Large Reservoirs and Channels." This hypothesis is necessary and sufficient for a correct understanding of water resources development planning as seen in the ancient irrigation works in Sri Lanka.