Evolution of the Indigenous Village Irrigation Systems of Sri Lanka

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Traditional Beliefs Based on Chronicles

A commonly-held belief among some historians and scholars in the past, was that the art of irrigated agriculture was brought to this country by the early Aryan settlers who had migrated to Sri Lanka from various parts of continental India prior to the arrival of Vijaya around 500 B.C. This belief had been largely based on various fragmentary references in the *Pali Vamsa* chronicles, chiefly the *Dipavamsa* and *Mahavamsa*.

As commented by Geiger (1912), the *Dipawansa* represents the very first unaided attempt made at creating an epic from traditional source materials available. "It presents a curious mixture of legends, myths and history, but it contains a kernel of historical truth buried in tradition and legends, most of which are of special value in the reconstruction of history".

Mahanama, the author of the *Mahavamsa*, states very clearly that his work was based on previous works written by *Poranas* which he says of full of repetitions and contained unbalanced details and that his revised work is free from such faults. The historicity of the *Mahavamsa* has been adequately proved on the strength of contemporary Indian sources both literary and epigraphic. Geiger (1927) had been able to bring together ample evidences from other sources to justify the faith which scholars placed on this chronicle. The commentary on the *Mahavamsa* is popularly known as the *Mahavamsa-Tika* (Malalasekara, 1927).

The Vijayan legend as contained in the *Mahavamsa*, according to G. C. Mendis (1965), is not a story that came down from the original settlers – "it is a product of the mind and not a re-creation of what actually took place." As subsequently commented by Perera (1960) 'the *Mahavamsa* version is inlaid with myth and romance, but it is yet possible to extract from it a kernel of truth'. Two kernels of truth which could be identified are :

(a) Kuveni spinning cotton; and

(b) the pool or rudimentary pond beside which Kuveni was seated whilst spinning; and I shall build upon these two 'kernels' in the latter part of this text.

Doubts Raised by Discerning Minds

In his monumental volume titled, 'Ancient Ceylon', Henry Parker (1909) has distinguished between (a) digging channels as was the main requirement for irrigated agriculture in the flat alluvial plains in the arid environments of ancient Mesopotamia 2,500 B.C. versus (b) construction of reservoirs that were so essential for irrigation in peninsular India, as well as in the basement rock terrain of Sri Lanka.

He further states that "there is nothing to indicate that the first Gangetic settlers brought with them any knowledge of the construction of reservoirs, which as a general rule, were neither required nor made in the districts which where inhabited by their ancestors." Parker (1909) also states that 'credit for reservoir development and extension in the island should go to the first Sinhala rulers and their responsible advisors".

It should also be borne in mind that the ancient irrigation systems of Mesopotamia and the Indus valley had developed on what we now recognised as various types of young alluvial plains; while the irrigation systems in ancient Sri Lanka had, of necessity, to develop on the old hard rock peneplain of the low country dry zone. Furthermore, the irrigation systems of the flat alluvial plains of Mesopotamia were 'run-of-the-river type' where there was no need for storage reservoirs, whereas for irrigation in the hard rock peneplain of Sri Lanka's dry zone, a storage reservoir was an essential pre-requisite.

On the foregoing considerations, it is highly doubtful that there was any kind of irrigation technology transfer that could have taken place from the arid, mid-east irrigation systems to the 'wet –and- dry' monsoon tropics of the Indian Deccan and Sri Lanka's dry zone.

Brohier (1975) questions the legend of Indo-Aryan colonisation of Ceylon around the 6th century B.C. in the following terms. "how-be-it', the concept of irrigation development in the dry zone can hardly be accepted to have sparked from just this legendary event of Vijaya and his followers – more likely it connotes the arrival of several small bands of migrants from peninsular India crossing over to Ceylon in frail crafts in the pre-Christian era". This view point has been later supported by Seneviratne (2004) and will be discussed in a subsequent section of this paper.

Recent Studies on Settlement Archaeology in Sri Lanka and India

Thanks to the new vistas of knowledge generated in recent years by Siran Deraniyagala (1992, 1997), we are now in a more reliable position to be able to reconstruct the sequential development of human settlement and associated agricultural development from Early Iron Age 'circa' 1,500 – 500 B.C. (proto-historic) through to the Early Historic 'circa' 500 B.C. and the subsequent Middle Historic 300 A.D.- 1,200 A.D. periods.

Similarly, Rukshan Jayawardena (1997) has been able to reconstruct with a high degree of reliability, the growth of irrigated agriculture during the early historic period in Sri Lanka; and he concludes that the technique of building small tanks and simpler sluices (*keta sorowwa*) preceded the construction of large tanks and more sophisticated sluices (*Bisokotuwa Sorowwa*).

One should also take note of a significant feature of Sri Lanka's historical trajectory, which according to Senaka Bandaranayake (2000), is considered a "relatively late and extremely rapid transition from the Stone Age 'hunter-gatherer' to an advanced and literate agrarian civilisation". This transformation which seems to have taken place during the first millennium B.C. is, according to Siriweera (2004), a kind of historical leap that by-passes many of the complex stages of social and technological development that are found in the proto-historic cultures of the Indus valley or in the developed regions in the Indian Deccan.

Of special relevance and value to this study has been the first of the four volumes of "A History of Agriculture in India " by Randhawa (1982), which deals with the Neolithic and Chalcolithic Settlements in South India, as well as a detailed account of the Iron Age in Peninsular India. A special note should be made of his statement that " *Kurakkan (Eluecine coracana*) is a tetraploid of African provenance, and that its presence in India as early as 2000 B.C. is interesting as well as intriguing".

Taken in conjunction with Velayuthan's 'Agro-Ecological Regions of India (1999)', and 'Agro-Ecologial Regions of Sri Lanka (1996)' it is now possible to identify comparable Agro-Ecological Regions (AER) across which a commonality of agro-technology and irrigation technology transfer could have selectively taken place. The Agro-Ecological Regions Numbers 6, 7 and 8 located within the Deccan plateau of India are comparable with the AER's DL 1, DL 2 and DL 5 in Sri Lanka.

The State of Rain-fed Agriculture in Pre-Vijayan Sri Lanka and Transition to the Small Village Tank

The period 1000 B.C. to 500 B.C. is considered as the Pre-Vijayan period in this paper. It also corresponds to the Early Iron Age (EIA), the earliest manifestation of which in Sri Lanka has been radiocarbon dated as between 1000 B.C and 800 B.C. by Deraniyagala (1997).

This Pre-Vijayan period in Sri Lanka was, on the whole, characterised by various forms of rain-fed agriculture that were themselves at different stages of development and which occurred together with other forms of rudimentary 'slash-and-burn' as well as various types of 'fire-stick' farming as practised by some of the Australian aboriginals. Supporting evidence for the prevalence of these various forms of early rain-fed agriculture could be had from Randhawa's (1982) description of the state of agriculture in later Vedic (1000 B.C. to 600 B.C.) period of India. It was the mastery of iron technology that led to the invention of the socketed iron axe, which in turn provided an efficient tool for man to clear jungle with the use of fire and iron axes, according to Randhawa (1982).

It is now recognised that the Early Iron Age (EIA) culture of Sri Lanka had been an intrusive culture from Peninsular India, according to Seneviratne (2004), and it represents "sporadic movements of small communities from the early Iron Age techno-cultural complex of Peninsular and Deccan India into Sri Lanka".

It has been further elaborated by Seneviratne (2004) that there is no evidence of a mass invasion of imagined Dravidian or Aryan 'races'; rather what had taken place was 'an intrusion of small communities bringing along with them technological and other cultural elements that integrated themselves with the pre-existing stone-using communities. This is more in accordance with Brohier's (1975) perception which connotes the 'crossing over to the island of very small bands of migrants in frail crafts'.

It is also now established that it was this culture that introduced domesticated crops such as the various types of millet together with animal domestication, namely, the humped bull and horse to this country. Millet is a group name for a number of cereals known as coarse grains which are grown under rain-fed conditions on dry lands, and are of short duration, three to three and a half months from seeding to harvest and, therefore, fit in very well to the dry zone's rain-fed *maha* cultivation season. *Kurakkan* which is known as '*ragi* ' in India, is the most widespread of the millets in the Indian sub-continent extending all the way to Nepal and Assam.

By the 6th century B.C. the Iron Age was well established across most of Peninsular India, especially the Deccan according to Randhawa (1982). axes, iron ploughshares and

sickles of iron made farming more efficient; and a large production of iron together with manufacture of iron axes enabled the people of Deccan India to cut down virgin forest and expand into hitherto unexplored parts of the country.

A similar, but at the same time, a slightly less advanced development could be postulated for Sri Lanka by around 500 B.C. With further refinements that could have been made in iron technology, sharper and harder tools would have become available for an accelerated phase of cutting and burning the hard wood forests of the dry zone of Sri Lanka.

The early Iron Age (EIA) folk, according to Seneviratne (2004), "were both semi-nomadic as well as sedentary communities; and they thrived on a multi-resource spectrum of :

(a) hunter-gathering ;
(b) pastoral activities; and
(c) subsistence farming" all of which had spread across the different habitats of the dry zone.

The hunter-gatherers thrived in the *savannah* and other light open forests which best-suited these semi-nomadic communities. The dry *damana* grasslands, especially in the Thamankaduwa region where essentially the habitat of the roving pastoralists of that period. Somasiri and Panabokke (1968) had studied the factors that govern the occurrence and development of these dry *damana* grasslands, and they have concluded that these grasslands are a 'biotic climax' which have been kept in this state by the annual firing by man (the pastoralists) since the Early Historic period, and continue to the present period. It is significant that up to the present time there is a great paucity, or even an absence, of small village tank settlements within these dry *damana* areas. At the same time, a high incidence of potsherds had been encountered within these dry *damana* grassland areas during the course of field soil surveys conducted by the National Soil Survey during the period 1960 to 1970.

With further improvements in iron technology that had taken place in Sri Lanka around this period, it had become possible to produce harder and better quality iron implements which would have helped in a selective felling and burning of the tough, hard-wooded dry zone forests. As a result, by 500 B.C., rain-fed chena cultivation had spread across most parts of the dry zone wherever a combination of a good quality of soil together with an assured dry season supply of domestic water was available. By matching the 1:500,000 scale Soil Map of Sri Lanka 2002 edition, against the hard-rock ground-water regions of the dry zone, now termed the 'regolith aquifer' (Panabokke, 2007), it has been possible to identify the more favoured areas where such sedentary 'chena' farmers would have been the pioneer settlers (Panabokke, Forthcoming).

By around 350 B.C. iron tools of superior hardness had been developed which made it possible for settlers to dig and excavate the weathered underlying rock or ' regolith' down to depths of around 200 cm. This in turn enabled the rain-fed chena farmers to make rudimentary ponds of sufficient depths in which they could save an adequate supply of water to meet their dry season's basic domestic requirements (see, Panabokke-Groundwater Conditions in Sri Lanka in Regolith Aquifers in the Hard Basement Rock, 2007).

Sedentary rain-fed chena cultivation, had by now, become the dominant and most widespread form of rain-fed agriculture in the dry zone regions of the present-day North Central (Rajarata), North Western (Wayamba) and Southern (Ruhuna) Sri Lanka, especially across the Reddish Brown Earth region of the country (See, Soil Map of Sri Lanka Panabokke, 1996). The three principal crops that dominated rain-fed agriculture at this particular stage were: *kurakkan* (*Elucine coracana*) a food crop; gingelly (*Sesamum indicum*) an oilseed crop; and cotton (*Gossypium Arboreum indicum*) a clothing fibre crop.

It is now known that *kurakkan* or finger millet had been cultivated in parts of Africa since the beginning of the Iron Age, and it was the staple crop of the countries in the African regions. It was introduced to India some 3,500 years, ago after which, it spread in Sri Lanka. It is mainly grown as a rain-fed crop in chenas, and to a lesser extent as an irrigated crop in the Jaffna peninsula and in parts of South India. Its grain is of great nutritive value, and it can be stored for long periods (for more than 50 years) without application of insecticides. The seeds are small and they dry out quickly, and insects cannot live inside them. It is also a hardy crop which is less susceptible to pests and diseases than any other grain crop. It tolerates dry spells in its early stages of growth, and it has a greater ability to utilise soil phosphate reserves better than other cereals. One could, therefore, understand why it had become the most dominant cereal food crop in Sri Lanka during the Early and Middle Historic Periods between 500 and 300 B.C.

Gingelly or 'sesame' is believed to have been introduced from Africa to India via Mesopotamia. Once introduced and grown in India, sesame entered the Indian diet and cookery to such an extent that it came to be recognised as an indigenous Indian crop. It was the principal source of edible oil in the ancient Sri Lankan diet during this early period prior to the use of coconut oil in the subsequent period.

Based on the foregoing information in respect of *kurakkan* (finger millet), it could be justifiably inferred that

rain-fed agriculture of the Early and Middle Historic periods of Sri Lanka, was essentially *kurakkan* based, and that the staple crop of the common people at that time was *kurakkan* . However, its one main limitation was that its grain yield per acre was less than rice, specially irrigated rice and it, therefore, could not support rapidly increasing population.

Of all domesticated rain-fed crops of that period, cotton was the most widespread and also readily grown crop in the Old World according to Hutchinson (1962). The main race of cotton (*Gossypium Arboreum indicum)* had been extensively cultivated in India even earlier than 1000 B.C . It is, also very well recognised that the knowledge and cultivation of cotton had spread to the rest of the world from India.

It is, therefore, not surprising that by 500 B.C. it would have been a commonly grown crop in Sri Lanka, more specifically, because it provided the most acceptable source of fibre that could be woven into clothing materials for daily wear.

The earliest known cotton fabrics in the Old World belonged to the Indus civilisation at Mohenjo-Daro in Sind, and are dated to approximately 3000 B.C. It is, therefore, not surprising that the art of making simple cotton fabrics would have been prevalent in Sri Lanka during the Pre-Vijayan period. The Vijayan legend provides a reliable indicator of the status of agriculture around that period of 500 B.C. which states that Kuveni was seated under a tree spinning cotton when Vijaya and his followers are said to have landed in Sri Lanka. Similarly, the pool beside which Kuveni was seated , indicates a further development of the rudimentary ponds to a larger size pool.

By about 350 B.C., it was experienced that rain-fed chena cultivation alone could not meet the increasing food requirements of an expanding population. Furthermore, in order to get beyond the status of subsistence living, it was recognised that irrigation had become a necessity. The evolution of the rudimentary ponds in the stream landscape of the hard rock basement region has been described by Panabokke (2009).The accompanying Figure 1, shows the location of the rudimentary ponds in the stream landscape of the hard rock basement.

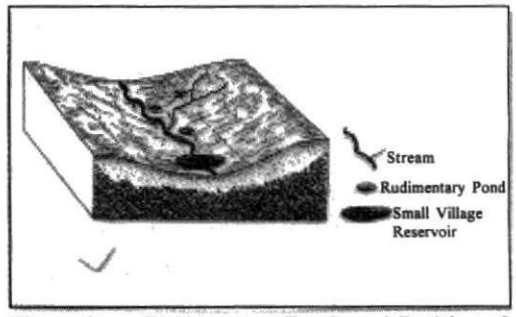


Figure 1: Rudimentary Ponds and Position of Village Reservoir

As further stated by Brohier (1959), it is possible that many a primitive pond-reservoir was later converted to a tank as the science of irrigation progressed. By around the second century B.C. transition to the small village tank had become almost complete. According to Nicholas (1959), "the village tank was a well-established feature of the dry zone by the beginning of the second century B.C".

In conclusion, it should be unequivocally recognised that while rain-fed agriculture provided the foundation for the evolution of the small tank settlements, any future attempt at small village tank rehabilitation cannot afford to overlook the symbiotic role played by the rain-fed chena component in respect of the whole village settlement complex. Small village tank rehabilitation cannot be considered outside the context of its associated rain-fed 'chena' lands, if it is to make any headway in future.

The Evolution and Spread of the Small Village Tank and Small Tank Cascade System in North Central Province of Sri Lanka

At the outset, it should be borne in mind that for any form of human settlement to get established in the exacting environment of Sri Lanka's dry zone, an assured and a reliable supply of water, especially for domestic needs, is an essential prerequisite in order to tide over the protracted dry season that occurs every year from May to late September. Of man's hierarchical needs of water, that for drinking, washing and other domestic requirements gets precedence over that for irrigation.

In the quest for an assured, but limited supply of this precious liquid water supply, it would soon have been recognised that, in the absence of any form of naturally occurring shallow ground-water in this hard rock basement region, some manner of surface storage of water in small rudimentary ponds would have been the only feasible alternative. As perceptively commented by Ievers (1899) "it may be broadly stated that without artificial storage of water, human existence in the North Central Province would be impossible".

These early man-made rudimentary ponds would have been able to capture the rainfall as well as the local run-off during the rainy '*maha*' season, and where these ponds were of sufficient depth, they could have stored and held an adequate supply of water over the ensuing five-month dry season, during which, by frugal use could have met their basic domestic water requirements.

It would not have been very long before they would have discovered that the ideal location for making such surface storage rudimentary ponds were the numerous small inland valleys that dissect or 'criss-

cross' the undulating landscape of the North Central dry zone. Quite fortuitously, the highest density of such small linear inland valleys happens to occur around the central part of the North Central Province. This is quite evident by reference to 1 inch to 1 mile topo sheets of the region as well as by stereoscopic view of air photographs (Also see Panabokke (2009), pages 12 – 17 for further elaboration).

It is, therefore, not surprising that this particular region afforded the best opportunities for the early settlers to locate these small rudimentary ponds of sufficient depth which could provide the domestic water needs of the early settlers even during prolonged dry periods. Furthermore, the inland valley geomorphic location provided the most reliable and dependable position in this undulating landscape for a sustainable harvest and storage of water.

With further improvements and refinements in iron technology, it was possible to make harder and sharper iron tools which would have enabled a deeper penetration and digging and excavation of deeper ponds. Around 300 B.C. iron tools of superior hardness that could engrave the *'Brahmi'* scripts on the hard rock, drip-ledges of caves had also been perfected. As many as 4,000 lithic inscriptions on the very hard rock surfaces of this country have been found which have been reliably dated to the period between 250 B.C. and 50 A.D. (Raj Somadeva, 1997).

With such iron tools of superior hardness it would have been possible to dig below the decomposing rock to depths of more than 1.5 to 2.0 metres. This, in no uncertain terms, enabled the advance from the small rudimentary pond to the earliest prototype of the small village reservoir with a larger storage capacity; and also with an adequate storage and supply of water that could meet the needs of several families located around this small reservoir-pond. This could be considered the earliest form of small tank settlement from which grew out the traditional small tank village as we now recognise it. In other words, it could be broadly stated " that the DNA of Sri Lanka's tank irrigation civilisation had taken shape at this stage of its evolution"

By the third century B.C., stable human settlements had become well established around this early prototype of the small village tanks. The size or storage volume of these tanks in their early stages, especially in relation to their depth, was just about sufficient to meet the domestic needs of the family settlers around these very small tanks. Furthermore, at this stage of evolution, their primary food needs came from 'swidden' or rain-fed chena cultivation with *kurakkan* being the main cereal component.

Once they had advanced to a stage where they were able to construct village tanks with a larger storage capacity, the cultivation of rice became possible. One special circumstance that favoured the cultivation of wetland rice in that part of the land immediately below the small tank, was essentially the hydromorphic or seasonally wet soil condition.

Earlier in this chapter, mention was made of the numerous small inland valleys that dissect or 'criss-cross' the undulating landscape of the North Central Province. The early settlers in this landscape took advantage of this feature to make chains of small tanks along the length of these shallow valleys, which gave rise to the development of 'cascades' of small tanks that were discussed by Madduma Bandara (1985) and M.U.A. Tennakoon (1994) .

Tennakoon (1994) states that, "the cascade concept is an age-old concept which had been the linking thread of irrigation development and management throughout the irrigation history of this country". He has also brought out the special features of the small tank cascade systems in relation to the traditional settlements of the Rajarata in the special publication titled, 'Food Security and Small Tanks in Sri Lanka'. Of special significance is, his recognition of indigenous terms such as *heenna* (low mounds of earth), *mudunna* (summit) and *elawaka* (a sideway elevating land in the keel of a shallow valley and several other traditionally used names for various land forms associated with a cascade.

The Small Anicut Systems (*Amunas*) of the Kandyan Kingdom

During the Kandyan Period (1524 - 1815), there was a significant migration of people from the dry zone to the mid and up-country regions of the country. As stated by Brohier (1975), " the certainty of rain which seldom failed in the Hill Country regions rendered a tank system for storing water unnecessary.... these up-country fields were aswaddumised into a succession of terraces carved out of the sloping land, and these *liyaddes* were muddied for growing rice" This aspect of land use is confined to what has come to be called the Kandyan region. He further states " the descendants of the great engineers who were unrivalled in their knowledge of the art of irrigation were able to adapt their science to the mountain zone with great success" He further states " the kings, nobles and the people who sought refuge in the mountains had to establish a system of an indigenous agriculture which had hitherto supplied them with food on a permanent , sedentary basis. They threw small blockades or anicuts (most of them reinforced with sticks and brush-wood) across the streams, to turn the water into small channels to irrigate the *liyaddas*".

In the mountainous regions of Sri Lanka, there are numerous 'run-of-

river' systems known as *amunas* (anicuts). In a path-finding study of the anicut system of the Upper Walawe River Basin by F. Molle et. al.,(2003), it is stated "Sri Lanka is famous for the numerous anicuts and small tanks. However, these tanks occupy only one part of the island (namely, the dry zone). The anicuts also constitute a very prominent feature of water use in the island as could be seen in accompanying Figure 2 of this text. This Figure prepared by Molle et al is best compared with Figure 1, of Page 3 of Panabokke's ' Small Village Tank Distribution in the Dry Zone (2009).

The most reliable statistics available to date in respect of village irrigation systems, both small village tanks, as well as small anicuts (*amunas*) is that provided by the 'Village Irrigation Survey 2002' published by the Department of Agrarian Services. The results of this survey have been published in a set of 25 volumes, representing each of the 25 administrative districts covered in the survey. The key findings from this survey are given in Table 1.

Although the total number of anicut systems (12,950) is nearly the same as the total number of small tanks (11,261), the total command area of all anicuts put together (250,000) is only about half the total command area (547,000) of the small tanks put together as shown in Table 1 below.

Despite this, however, the total number of farm families benefiting from the anicuts (*amunas*) is nearly the same as the number benefiting from small village tanks. Moreover, as could be seen in the Table1, the more reliable water supply that obtains in the anicut (*amuna*) system enables farmers to achieve a higher cropping intensity than in the small village tanks of the dry zone which have a less reliable water supply as well as a comparatively lower endowment of water.

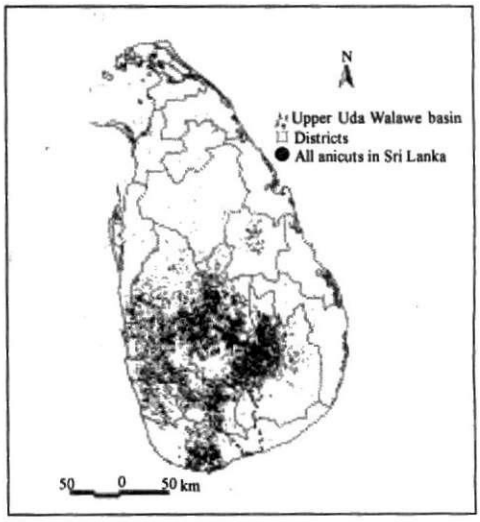
It is also observed that approximately 80 per cent of the anicuts are located in the districts of Badulla, Kandy, Ratnapura and Nuwara Eliya with the Badulla District having a total of approximately 3,600 anicuts and Kandy 1,500, Ratnapura 1,400 and Nuwara Eliya 1,100 respectively. By comparing the distribution pattern of the anicuts against the Agro-Ecological Regions (AER) of Sri Lanka, it could also be observed that the highest density of small anicut systems are located within the mid- and up-country Intermediate Zones of the Badulla, Nuwara Eliya and Kandy Districts all of which constitute the former Kandyan kingdom.

Based on his study of the Upper Walawe Basin, Molle (2003) concludes that, " the upper catchment of the Walawe Basin had been the site of many early human settlements, and kingdoms centred around cities such as Balangoda or Kaltota which developed from the second century B.C. to the fifteenth century A.D. The region then declined and it was sparsely populated when the British established tea cultivation in the area.

Writing on the social and economic conditions in the Kandyan kingdom in the seventeenth century, L.S. Dewaraja (1995) states,. " The economy of the Kandyan kingdom was a purely agrarian one, dependant on the successful cultivation of paddy. In the Kandyan areas the steep mountain slopes were terraced or cut into steps three to eight feet wide, and the water collected, regulated and skilfully distributed from summit to foot, a technique that has been preserved unchanged to this day." It is also stated that all paddy lands in the kingdom were subject to compulsory services, both military and otherwise, during the reigns of the former rulers.

What is of special importance of these anicut systems of the Kandyan kingdom is their great durability and sustainability over the past centuries up to present times. It is this durability and stability that enabled the rulers of the Kandyan kingdom, notably Rajasinghe II (*Deveni* Rajasinghe) to engage in battle and drive out the Portuguese and the Hollanders. Unlike the village tanks in the dry zone which could be easily breached and destroyed by the invading armies, the anicut systems of the Hill Country were quite robust, and could not be easily damaged and rendered non-functional, especially those located within the inland valley systems and the terraced slopes of the landscape. At worst,

Figure 2: Anicuts in Sri Lanka



Source: Department of Agrarian Services

Table 1: Number of small tanks and anicuts, and their command areas and number of farm families benefiting

Type of Irrigation	Total number	Command Area (acres)	Number of farmer Families
Small Tanks	11,261	547,000	334,000
Anicuts (*Amunas*)	12,950	250,000	349,000

Source: Department of Agrarian Services, 2002.

the enemy could only destroy the standing crop at the harvesting stage as carried out by the retreating Portuguese armies and later by the British in the aftermath of the *Uva* Rebellion.

John Davy (1821), in his " Account of the Interior of Ceylon' compiled almost 200 years ago states that, "in no part of the world is agriculture more respected or more followed than in the interior of Ceylon (referring to the Kandyan kingdom) where rice cultivation is carried out with utmost, care and attention." Taken together with Robert Knox's (1681) very detailed and accurate description of the various stages of rice cultivation in the Kandyan kingdom, there is but little doubt that rice (paddy) cultivation under these small anicut systems would have constituted the central core of the Kandyan culture as well as its distinctive civilisation which had helpd it to endure against repeated hostilities.

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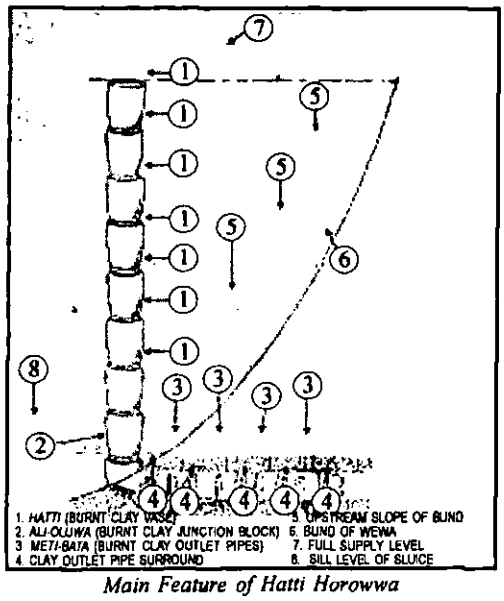
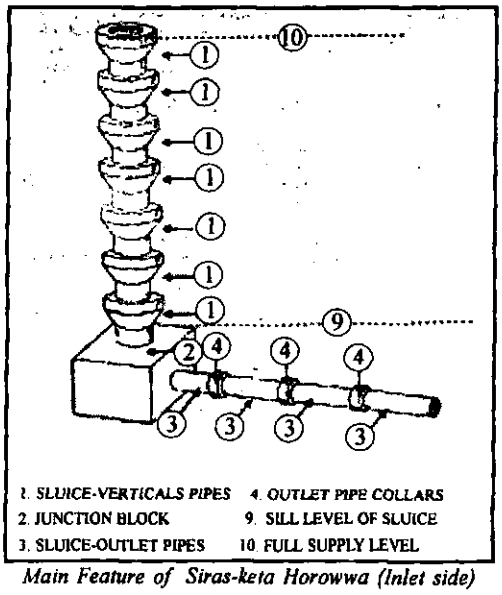


Main Feature of Hatti Horowwa



Main Feature of Siras-keta Horowwa (Inlet side)

(Panabokke, C.R.(2009), Small Village Tank Systems of Sri Lanka: Their Evolution, Setting, Distribution and Essential Functions. HARTI, Colombo.See page 79 to 81)