CISTERN SLUICES AND PISTON SLUICES

SOME OBSERVATIONS ON TYPES OF SLUICES AND METHODS OF WATER DISTRIBUTION IN PRECOLONIAL SRI LANKA

The achievements of the hydraulic civilization which flourished in Sri Lanka till about the thirteenth century represent some of the major technological feats of premodern man in his constant struggle to gain control over water. The pioneer European engineers, who came to participate in the projects of the colonial administrations to improve irrigation facilities, were the first to draw the attention of modern scholars to the need to examine in detail the technical aspects of the ancient irrigation works they found in the island. From the nineteenth century onwards, several technologists and scholars, Asian as well as European and American, have been attracted by the technological achievements of this civilization to study them and to examine the social and political implications of dependence on what was "high technology" for that early age. After a fairly long period of diminished interest, a renewal of research activity in this largely neglected but significant field of study has been witnessed during the last decade.

In a recent contribution, Professor P.E.E. Fernando has examined an inscriptional record relevant to the study of irrigation technology and water management. His paper titled "Vessagiri Slab-inscription No. 2 of Mahinda IV and the Sluice Cistern" was submitted on 28 August 1985 for publication in *The Sri Lanka Journal of the Humanities* and was duly published in Volume 9, the issue for 1983, which was, however, printed and released only in July 1986.[1] The inscription in question was edited by the late D.M. de Z. Wickremasinghe who was one of the pioneers in epigraphic studies in Sri Lanka. The only major publication seen before his time was the work of Eduard Müller which, despite the immense significance of its contribution to the development of epigraphic studies in the island, bristled with errors of decipherment as well as of translation. A fair number of the records published by Wickremasinghe were being edited and translated for the first time. The Vessagiri inscription No. 2 was in fact the

---

1. P.E.E. Fernando, "Vessagiri Slab-inscription No. 2 of Mahinda IV and the Sluice Cistern", *The Sri Lanka Journal of the Humanities*, vol. IX (for 1983), 1986, pp.95-107.

second record written in what may be called the early medieval form of the Sinhala language that Wickremasinghe edited. It appeared in Part I of the first volume of the *Epigraphia Zeylanica* which was published in 1904.[2]

More than two decades ago when the present writer was studying the irrigation rights of monasteries the significance of the Vessagiri record attracted his attention. However, Wickremasinghe's reading and translation of the inscription presented formidable problems. As the present writer commented at that time,

> Wickremasinghe confessed that he could not make out the meaning of the term *a(ya)samā(nāra)dolen* in the phrase *näsuvanaṭ a(ya)sama(nāra)dolen tabā denukoṭ*. This is, evidently, one of Wickremasinghe's initial and less careful attempts. He deciphered the passage correctly but faltered in the separation of words. If this is done correctly, the phrase would read, *näsuja naṭ a(ya) sama(na ra) dolen tabā denu koṭ*, 'the income lost should be made good (*samana* probably from *samay*, 'to settle') by the state (lit. royal palace)'.[3]

Several years later, in his study of the type of sluice which he called the cistern sluice, the present writer noted again that the Vessagiri inscription contained valuable information indicating that sluices at reservoirs were clearly fitted with mechanisms which could be opened or closed to enable the regulation of the outflow of water and that markers set up inside the reservoirs were utilised for controlling the quantity of water released from reservoirs.[4]

---

2. *Epigraphia Zeylanica*, vol. I, pp.29-38.

3. R.A.L.H. Gunawardana, "The History of the Buddhist Saṅgha from the Reign of Sena I to the Invasion of Magha (833-1215 A.D.)", Ph. D. dissertation, University of London, 1965, p. 96, n. 1; R.A.L.H.Gunawardana, *Robe and Plough: Monasticism and Economic Interest in Early Medieval Sri Lanka*, Tucson: Association of Asian Studies, 1979, p. 73, n. 130. See also *Epigraphia Zeylanica, vol. I, p. 38 n.1.*

4. R.A.L.H. Gunawardana, "Hydraulic Engineering in Ancient Sri Lanka: The Cistern Sluices" in *Senarat Paranavitana Commemoration Volume*, ed. L. Prematilleke *et al.*, Leiden: E.J. Brill, 1978, p. 69.

A period of extended fieldwork in the Karṇāṭaka and Tamilnād states of South India during the latter part of the 1970s drew the attention of the present writer to another noteworthy aspect of irrigation technology in precolonial South Asia. One of the objectives of his fieldwork had been to verify whether the cistern sluice was in use outside Sri Lanka. This survey yielded one clear instance of a cistern sluice at a reservoir at Gaṅgaikoṇḍa-cōlapuram. As pointed out in a paper presented before the Seminar for Asian Studies at Peradeniya in April 1984, it was also abundantly clear that a distinct type of sluice had been as widely used in the Karnnāṭaka and Tamilnad states as the cistern sluice had been in Sri Lanka.[5] Future researchers may discover a few more cistern sluices in South India, but it is most likely that they would be comparatively rare and would represent instances of the penetration of the influence of Sri Lankan irrigation technology in such times as the period of rule by the Cōḷa dynasty.

Unlike the cistern sluices of Sri Lanka which were located on the inner face of the embankment of the reservoirs, the inlets and the regulating mechanisms of the South Indian sluice were located on the bed of the reservoir, sometimes at a considerable distance away from the embankment. The sites of the sluice mechanisms are marked by stone columns which supported a series of slabs with apertures through which a cylindrical pole, or a piston, was lowered to close the outlet of the reservoir. Hence the name "piston sluice" suggested by the present writer for these devices. Compared with the cistern sluices of Sri Lanka which handled large quantities of water, the piston sluices were clearly at a certain disadvantage. For example, the largest of all the outlet apertures of piston sluices examined by the present writer was at Ramnad and measured 410.5 square centimetres. This compares poorly with the large sluices of Sri Lankan reservoirs such as Nuvaravāva. The northern Low Level Sluice of this reservoir had outlets measuring 9000 square centimetres in area. Owing to the small water-handling capacity of the piston sluices, it was necessary to have at each South Indian irrigation reservoir a large number of sluices than would be found at a Sri Lankan reservoir of similar proportions. On the other hand, the piston sluice with

---

5. R.A.L.H. Gunawardana, "Intersocietal Transfer of Hydraulic Technology in Precolonial South Asia: Some Reflections Based on a Preliminary Investigation," Peradeniya: Seminar for Asian Studies (Discussion Paper No. 14 of 4 April 1984), subsequently published in *Southeast Asian Studies*, Kyoto, vol. XXII, no. 2, 1984, pp.115-142.

its lower water-handling capacity and outlets located at a considerable distance from the embankment minimized the threat to the embankment through seepage of water. The arrangements concerning this type of sluice also meant that surreptitious operation of the sluice was more difficult for those who tried to steal irrigation water. The piston sluice clearly enjoyed wide popularity in South India before the modern sluices were introduced by the British colonial administration. Some piston sluices are still to be seen in use in certain parts of the Tamilnāḍ and Karnnāṭaka states.[6]

The experience of examining the remains of several piston sluices in the field directed the present writer's attention to the significance of certain passages in the Jātaka collection of stories and its commentary:

> The Sādhīna Jātaka in the Theravāda collection of stories about the previous incarnations of the Buddha contains a mnemonic verse which includes the phrase *imaṃ nikkhaṃ sukuṇḍalaṃ*.[7] In the Theravāda canon, the term *nikkha* generally denoted "a golden ornament for the breast or neck" or "a ring" while the term *kuṇḍala* was used in the sense of "a ring" or "an earring".[8] However, the *Jātakaṭṭhakathā*, the exegetical work on the mnemonic verses in the Jātaka collection, gives a different explanation ... It is interesting to note that this commentator explains the term *nikkha* as a sluice (*udakanidhamanaṃ*) He further explains *sukuṇḍalaṃ*, the last word in the phrase from the mnemonic verse, as *musala - pavesana - kuṇḍalena samannāgataṃ*.[9] *Musala* is a common term in both Pāli and Sanskrit which denotes "pestle," and the whole phrase may be translated as "fitted with a ring (i.e. circular aperture) through which the pestle was inserted. The description leaves little doubt that the sluice the commentator

---

6. The information in this paragraph is based on the paper cited in n. 5.

7. *The Jātaka*, ed. V. Fausböll, London: Pali Text Society, vol. IV, 1963, pp.358-9.

8. T.W. Rhys Davids and W. Stede, *The Pali Text Society's Pali-English Dictionary*, London, 1959, pp.220, 353.

9. *The Jātaka*, vol. IV, 1963, pp.358-9.

> had in mind was of the piston-valve type. It is evident that the piston was referred to as "the pestle," and certainly the resemblance would have been striking.[10]

It seems likely that the *Jātakaṭṭhakathā* was written by a monk who lived in India and that he was a contemporary of Buddhaghosa.[11] This would explain why references to the South Indian type of sluice were introduced into this work.

The *Jātakaṭṭhakathā* was one of the texts preserved and carefully studied in Sri Lanka. Thus the passage in question and the reference to the piston sluice would have been known to at least the community of scholars in the island. The present writer has pointed out that the passage discussed above had received the attention of a Sri Lankan exegetist who lived in about the twelfth century.[12] In this work, "the term *rajamohol*, which literally means 'king's pestle,' was used to denote the piston." Another term, *bisōkoṭu*, which will be discussed at length later on, was used to denote the circular aperture (*kuṇḍala*) of the sluice valve.[13] One might further add that, at such a time when monks as well as merchants, migrants and soldiers travelled from South India to Sri Lanka and in the reverse direction, there would have been quite a few individuals in each area who had seen and developed an awareness of the irrigation devices in use in the other. It is, therefore, not difficult to imagine situations in which irrigation devices such as the piston sluice used in South India were introduced into Sri Lanka. Reflection on this point led to the realization of the significance of the passage in the Vessagiri inscription which had not been previously grasped:

> There is at least one inscription from the tenth century which seems to suggest that the piston sluice was something more than hearsay to Sri Lankans. The phrase *mohol naṅgä* occurs in the Vessagiri inscription where Mahinda IV specifies in detail the arrangements he instituted for the

---

10. *Southeast Asian Studies*, vol. IV, 1963, pp.358-9.

11. *Ibid.*, p. 132. G.P. Malalasekara was of the opinion that this work should be attributed to Buddhaghosa. *Dictionary of Pāli Proper Names*, London: Pali Text Society, vol. II, 1960, p. 309.

12. *Southeast Asian Studies*, vol. XXII, no. 2, p. 133.

13. *Musalappavesana-kuṇḍalena, mohol hena vaḷin hevat* (contd.)

> distribution of water from the Tissa reservoir at Anurādhapura.[14] The phrase is left untranslated by Wickremasinghe who published this inscription. He appears to have assumed that it was a proper name. The term *naṅga* occurs in the sense of "raising" in the tenth-century work called *Dhampiyā Aṭuvā Gāṭapadaya*.[15] The phrase *mohol naṅgä* may be translated as "having raised the piston." ... If this interpretation is correct, it would imply that a piston-sluice was in operation at this particular reservoir in the tenth century.[16]

Professor Fernando prefers to read the word *naṅgä* in the phrase *mohol naṅgä* as *naṅgā*.[17] It is true that the medial *ā* occurs in the endings of a number of absolutives to be found in epigraphic records of this period. However, there are also quite a few instances to be seen in these inscriptions where absolutives end in the medial *ä*. Terms like *ikmä* and *genä* may be cited as examples.[18] The estam page of the Vessagiri record reproduced together with Wickremasinghe's edition could have been better, but the present writer's re-examination of it did not provide him with adequate grounds to reject Wickremasinghe's reading as faulty. Further, several verses on the Mirror Wall of the Sīgiri rock were found to contain the term *nägä*, a variant of the absolutive in question.[19] Commenting on the absolutives found in verses at Sīgiri, Paranavitana observed that "all or most absolutives which ended in *-ā* in the earlier period had also variants with final *-ä*."[20] The information from the graffiti at Sīgiri appears to support Wickremasinghe's reading.

---

rajamohol eḷana bisōkoṭuyen. Jātaka Aṭuvā Gāṭapadaya, ed. D.E. Heṭṭiāracci and M. Sri Rammaṇḍala, Colombo: University of Ceylon, Pt. II, 1960, p. 94.

14. *Epigraphia Zeylanica*, vol. I, p. 33, line 16.

15. *Dhampiyā Aṭuvā Gāṭapadaya*, ed. D.B. Jayatilaka, Colombo, 1932, p. 260.

16. *Southeast Asian Studies*, vol. XXII, no.2, pp.133-4.

17. Fernando, *op.cit.*, p. 96.

18. *Epigraphia Zeylanica*, Vol.I, p.48, lines 40, 42, 44.

19. S. Paranavitana, *Sigiri Graffiti, being Sinhalese Verses of the Eighth, Ninth and Tenth Centuries*, London: Oxford University Press, 1956, vol. II, p. 260 v. 420; p. 299 v. 485; p. 314 v. 511; p. 351 v. 569; p. 412 v. 670.

20. Paranavitana, *Sigiri Graffiti*, vol. I, p. cl.

The second point to which Fernando has devoted detailed attention is perhaps more significant since it pertains to the manner in which the distribution of water in ancient and early medieval reservoirs was regulated. As we shall see later on, a pillar (*pahaṇ*) erected at the mouth or inlet of the sluice which is described as *satara riyanak diyaṭ hinduvū diyakaṭä pahaṇ* appears to have been of crucial significance for these distributory operations. Fernando interprets the words *satara riyanak* or "four *riyan*" in this passage as indicating horizontal distance and not the height of the pillar. The height of the pillar he states, "would have been established by tradition."[21] However, vertical distance is critical in matters regarding the regulation of the distribution of water from reservoirs. It would have been most unusual if the individuals who drew up this record had not specified the height of this stone pillar which was to be so crucial for controlling the outflow of water from this reservoir. The circumstances under which this document was issued make such an omission extremely unlikely.

The inscription records the order given by Mahinda IV on the tenth day of the latter half of Binara, in the ninth year of his reign, as a result of the representations made to him by a group of monks led by the hierarch of the Mahāvihāra *nikaya*. These representations made at the highest level were about disputes (*viyavul*) concerning the traditional rights of the Isurumenu (Isurumuni) monastery to irrigation water from the Tisa (Tissa) reservoir. The details of the disputes are not given in the inscription, but it is possible, on the basis of the arrangements made by the king, to form an idea of the main aspects of the disputes. One such aspect was related to the competing claims of the lands of the Isurumuni monastery and the fields fed by the Kolomb canal to irrigation water from this reservoir, making it imperative for the king to give a ruling as to which group of water-users should receive priority. According to C.W. Nicholas, the Kolomb canal flowed northwards from the Tissa reservoir.[22] Secondly, the royal edict specifically directs the Keeper of the Royal Park (*maṅgul maha uyankämi*) and other royal officials not to violate the stipulations laid down there, thereby implying that there had been disputes between them and the administrators of the monastery. The royal park named Ran

---

21. Fernando, *op.cit.*, p. 98.

22. C.W. Nicholas, "Historical Topography of Ancient and Medieval Ceylon," *Journal of the Ceylon Branch of the Royal Asiatic Society*, New Series, vol. VI, p. 158.

Masu Uyana, mentioned in the inscription, was located in close proximity to this reservoir. The level at which representations were made and the fact that the king himself issued the order providing assurances of compensation in case of future losses to the monastery suggest that serious problems had arisen and that a virtual breakdown in the traditional arrangements had taken place. Tradition had to be redefined and bolstered by royal authority.

The edict laid down that the fields of the Isurumuni monastery were to enjoy priority over the lands fed by the Kolomb canal. On the other hand, the monastery was to enjoy parity of status with the royal park. Part of the water released first from the reservoir was diverted to the royal park and its appurtenant structures, but the simultaneous flow of water to a distributory reservoir (*dānavāva*) which would later feed the monastic fields was not to be obstructed (*ḍahak nätivā*) till the top of the stone pillar mentioned above became visible. One may infer that, at the time of the complaint, the flow of water to the reservoirs of the monastery had been interrupted by royal officials who claimed priority for the royal park. It would seem that, according to the new arrangement, such interference was unwarranted. The king specified that the officials could assume that the quantity of water due to the Isurumuni monastery had been released only when the water inside the Tissa reservoir had come down to the level of the top of the pillar. Attention could be directed towards other obligations like releasing water to the Kolomb canal only at this point. It would thus be clear that the level indicated by the top of this stone pillar and, therefore, its height were of critical importance.

In his comments Fernando has suggested that the phrase "four *riyan*" indicated "the limits within which the pillar had to be placed".[23] However, the qualifying term *hinduvu* in the passage in question indicates that this pillar had already been set up in place at the inlet. If the pillar had been so positioned at the mouth of the inlet, the floor of the inlet, which is usually stone-paved, would have served as an indicator of the base-level of that pillar. It will have been clear from our earlier discussion that any variation in the height of this pillar could affect the parties which had been involved in the previous disputes. Even a slight variation in the height of the pillar would affect the irrigability of a fair

23. My emphasis. Fernando, *op.cit.*, p. 98.

extent of field. Any curtailment of the height of this stone pillar would have brought an increased share of irrigation water for the Isurumuni monastery while the fields dependent on the Kolomb canal would have been adversely affected through the reduction of their share of water. Similarly, any increase in the height of the pillar would have had the opposite effect. It was imperative for a king trying to minimize disputes in the future to clearly indicate the height of this marker. Hence it seems most likely that the phrase "four *riyan*" indicated the height of this pillar. Thus the top of the pillar indicated the level of the reservoir at four *riyan* above the floor of the inlet. This was the crucial point at which the rights of the Isurumuni monastery to water from the reservoir ended.

As Fernando has observed,[24] the water in the reservoir had to be at the same level each season at the commencement of the distribution of water in accordance with the stipulations laid down in this record. If the level of water at commencement did vary, the quantity of water diverted to the fields of the Isurumuni monastery would vary accordingly while that diverted to the Kolomb canal would remain more or less constant. It would amount to underestimating the capability of the king and his officials if we assume that they did not foresee this. However, the inscription does not specify the level of water in the reservoir at the commencement of the distributory operations. In this context it is noteworthy that the Isurumuni monastery received the first turn of water. The silence of the inscription on the level of water at the commencement of distribution is understandable if the king and the officials as well as the representatives of the Isurumuni monastery expected the reservoir to be full at this point. In addition to its own catchment area, the Tissa reservoir depended on a supplementary source of water from the Kalavāva brought in by the Jayagaṅga canal and, hence, the assumption that the reservoir would be full was not unjustified. Unless there was an exceptionally severe drought when a totally different system of water distribution had to be introduced to meet it, the maximum level of water in the reservoir would be normally determined by the height of the spillway. The monastery would have been entitled to an uninterrupted supply of water from this point till the water in the reservoir fell to the level marked by the top of the stone pillar. The remaining quantity of water which could be discharged from the main sluice amounted to a head of four

---

24. Fernando, *op.cit.*, pp.98-9.

riyan or about six feet and, evidently, this was diverted to the Kolomb canal for irrigating fields outside the area where the Isurumuni monastery and its lands were located.

On the basis of the discussion in the preceding paragraphs, it seems justifiable to suggest that the relevant portion of the Isurumuni inscription may be translated as follows:

> Having raised the piston, water should be released without obstruction until the top of the stone (pillar) erected in front of the royal sluice, at its inlet, to (indicate) the water(-level) of four *riyan* (above the floor of the inlet), becomes visible.[25]

The passage helps us to recognise three elements of the sluice at the Tissa reservoir: i. the piston (*mohol*) for the regulation of the outflow of water, ii. the inlet (*diyakaṭa*) and iii. the stone pillar (*pahaṇ*) used as a marker to help regulate the quantity of water released from the reservoir. The information we have on South Indian piston-sluices directs our attention to a fourth element which would have been essential: the receptacle with a circular aperture into which the piston was lowered to close the sluice. It was this fourth element which was referred to as *bisokoṭu* in the twelfth-century text cited earlier.

At this stage, it seems relevant to examine the meanings of two related terms used in our sources with reference to sluices. These are *sorovu* and *bisokoṭu*. Of these, the term *sorovu* (var. *sorov*, *soro*) was used in the sense of "sluice", "conduit" or "orifice". As in the inscription cited above and the Batalagoḍa inscription to be discussed later on, in the *Pūjāvaliya*, too, the term *sorovu* is used in the sense of "sluice". The first and the last of these references are to piston-type sluices. While describing the manner in which the recitation of the *paritta* helped to protect the city of Visāla, ridding it of demons, the *Pūjāvaliya* states:

---

25. *mohol naṅgä radsoro pereṭä satara riyanak diyaṭ hinduvū diyakaṭä pahaṇ munduna (pä)nenatāk ḍahak nätivä diya pavatvanu.* *Epigraphia Zeylanica*, vol. I, p. 33, lines 17-8.

> At that time the demons began to run out of the four gates like unto a flood of water rushing out of the openings of four great sluices when the pistons (lit. royal pestles) are opened.[26]

In its description of the miracles performed by the Buddha, the *Butasaraṇa* uses the term *sorov* to denote orifices in his body through which he emitted forth fire and water.[27] In some instances the term *sorov* is used as the equivalent of the Pāli *niddhamana*. The latter term has been used to denote sluices.[28] However, it has also been used in certain Pāli texts to denote drains and subterranean passages for the disposal of waste water. It is with this connotation that the term was used in the Sigāla Jātaka, and the story concerns a jackal who gained entry into a city through such a passage.[29] The Kukkura Jātaka describes an instance of hunting dogs gaining access to the palace grounds through a similar passage.[30] Sometimes it was the criminal elements who sought entry into cities through these subterranean passages. The *Dhammapadaṭṭhakathā* contains a story about thieves who entered a city in this manner to burgle a rich man's house.[31] In both the *Pahamsaraṇa* and

---

26. *ekala amanuṣyayō rada moḷō hārapu maha soruvu doru satare-kin namāgat diya vaturak se satara maha vasalin piṭatata divannaṭa paṭangat-ha. Pūjāvaliya*, ed. Kirirälle Ñānavimala, Colombo: Gunasena, 1965, p. 443.

27. *dakuṇu kan sorovven naṁba taḷ kaṇḍa sā giṇikandak nägennaṭa vana. vam kan sorovven naṁba taḷ kaṇḍa sā diyakaṇḍek hennaṭa vana. dakuṇu kan sorovven naṁba taḷ kaṇḍa sā diyakaṇḍek nägennaṭa vana. vam kan sorovven naṁba taḷ kaṇḍa sā giṇikaṇḍek hennaṭa vana. Butasaraṇa*, ed. Labugama Lankānanda, Colombo: Gunasena, 1953, p. 97.

28. See for instance, *Sāratthappakasinī*, ed. Bihalpola Devarakkhita, Colombo, 1914, p. 512.

29. *niddhamanena nagaraṃ pavisitvā. The Jātaka*, vol. I, 1962, p. 425.

30. *punadivase rañño āroccayiṃsu: deva niddhamanamukhena sunakhā pavisitvā rathassa cammañca nandiñca khādiṃsuti. The Jātaka*, vol. I, 1962, p.175.

31. *corā udaka-niddhamaneneva nagaraṃ pavisitvā ekasmiṃ aḍḍhakule ummaggaṃ bhinditvā. The Commentary on the Dhammapada*, ed. H.C. Norman, London: Pali Text Society, vol. II, 1911, p. 37.

the *Pansiyapanas Jātakapota*, the word *sorov* is used again as the Sinhala equivalent of the term *niddhamana* in these contexts.[32] In the *Jataka Aṭuvā Gāṭapadaya*, the term *niddhamana* is explained as "conduit for water".[33] This may indicate the sense in which the term *sorov* was used in the latter instances.

As we have noted earlier,[34] the term *bisōkoṭu* was the equivalent of the Pāli *kuṇḍala* and denoted the receptacle for the piston. The translation of the relevant passage of the Sādhina Jātaka as found in the *Pansiyapanas Jātakapota* is somewhat corrupt, but it is clear that the same Sinhala term was used in this context.[35] In the *Jatakaṭṭhakatha*, the sluice is described as "fitted with" a *kuṇḍala*.[36] On this analogy, it may be suggested that the term *sorov* denoted the larger unit or the sluice in a general and wide sense while the term *bisōkoṭu* was used to denote one of its structural elements. It is particularly noteworthy that, at the time the *Jataka Aṭuvā Gāṭapadaya* was written, it was an element specific to the piston-type sluice. Though the piston-type sluice would have been utilised primarily for the regulation of irrigation water, it is possible that it was used also in other types of water regulation. As noted earlier, arrangements made at fortified cities for the disposal of waste water created new problems affecting their security. Since subterranean outlets for waste water permitted the surreptitious entry into the city of unwanted elements, it is likely that these conduits were fitted with sluice mechanisms which could be closed for reasons of security. If we were to accept the reading of an inscription found by the citadel of Anuradhapura, it would seem to refer to a piston-sluice being used for such a purpose at

---

32. *tava da siṅgāla jātakayehi vṛkṣa devatāva rātriyehi sorovven gamaṭa kāṇahilu vāda. Dahamsarana*, ed. K. Śrī Dharmakīrti Dhammānanda, Colombo: Granthākara, 1929, p. 124; *deveni davas rajjuruvanṭa kiyanne devayan vahansa sorovven ballō ātulaṭa vāda rathayehi sam ha varapaṭa kāvāhuyayi kiha. Pansiyapanas Jātakapota*, ed. G.F. Munasiṃha and D.B.M. Abhayavardhana, Colombo: Jinālaṅkāra Press, 1909-1921, p. 59.

33. *udaka-niddhamana nam vāri mārgaya yā. Jātaka Aṭuvā Gāṭapadaya*, p. 94.

34. See *supra* n. 13.

35. *melpalā tibena bisōkoṭu vārimārgadiya da.* It may be noted that the term *melpalā* occurs in place of the Pāli *musalappavesana. Pansiyapanas Jātakapota*, p. 978.

36. *musalappavesana kuṇḍalena samannāgataṃ. The Jātaka*, vol. IV, 1963, pp.358-9.

the Eastern Gate of the citadel.[37]

The term *bisōkoṭu* has also been used to denote elements of structures which are not related to the function of regulating water. In his description of the construction of a *stūpa*, the author of the *Dhātuvaṃsa* states that the pinnacle and the *bisōkoṭuva* were given a coating of lime which made them look strikingly white.[38] Similarly, the *Saddharmaratnavaliya* uses the terms *bisōkoṭuva* and *kärälla* to refer to constituent parts of the roof of the mansion built by the guild-leader Meṇḍaka.[39] In the latter text, the second term, too, seems to denote "spire" or "pinnacle" and, hence, the other term appears to refer to an associated element.[40] Paranavitana expressed doubts as to whether the author of the second text cited above was clearly aware of the architectural terms he was rendering into Sinhala.[41] However, it does seem likely that observers would have noted a similarity between the piston sluices and the upper part of the *stūpas* of early times. As Paranavitana himself pointed out, the term *bisōkoṭuva* was used to refer to the box-like structural element on the summit of the *stūpa* which is called *sataräs-koṭuva* in Sinhala and *harmikā* in Sanskrit.

---

37. *päḍi dora bisōkoṭuvehi*. However, it has to be noted that Godakumbure's readings of the letters *so* and *ve* in the last word are not beyond doubt. Compare the palaeographic form read as *so* with the letter *sa* as it occurs in lines A1, A6 and B1. Certainly the medial *o* is not visible. Similarly, compare what has been read as *ve* with the form which occurs in the word *sīmāvehi* in line C9. *Epigraphia Zeylanica*, vol. V, Plate 40; p. 331, lines B9 - C3.

38. *maṅgala mahā cētiyehi bisōkoṭuva da kot kärälla da candrakānti se atidhavala koṭa sunu karmanta da karavuyeya*. *Dhātuvaṃsa*, ed. D.M. Samarasiṃha, Colombo: Ratnākara, 1940, p. 73.

39. *ē maṇḍapayehi ... bisōkoṭuva hā kärälla pabaḷumuvāya*. This is a translation of the following Pāli passage: *tassa upari ... pavāḷamayasikharathūpiya ahesuṃ ... Saddharmaratnavaliya*, ed. D.B. Jayatilaka, Colombo: Lankābhinava, p. 779; *The Commentary on the Dhammapada*, vol. III, 1912, p. 364.

40. The word *kärāli* occurs as the equivalent of *sikhara*. See *Dhampiya Aṭuva Gāṭapadaya*, p. 284.

41. S. Paranavitana, *The Stupa in Ceylon*, *Memoirs of the Archaeological Survey of Ceylon*, vol. V, Colombo: Government Printer, 1946, p. 33.

A striking feature of the ancient *stūpas* was an octagonal pillar called *yupa* which was placed in such a manner that it projected upwards from the *harmika*. Remains of octagonal pillars have been found at the sites of the *stūpas* of the Abhayagiri, Mariccavaṭṭi and Mihintale monasteries.[42] Reliquaries fashioned in the form of *stūpas*, found more recently at Dälivala, Mihintale and Anuradhapura, provide a clear idea about the prominent position of the *yupa* at top of the *stūpa*. A good proportion of builders who worked on the *stūpas* would have had experience in the construction or maintenance of irrigation works and they would have been quick to note the resemblance that the pestle-like piston, poised above its receptacle, bore to the *yupa* which projected from the *harmika*. This would explain the use of the term *bisōkoṭuva* as a synonym for the *satarās-koṭuva*. It is possible that, later on, there was a further extension of the meaning of the term to include the base of the pinnacle or spire placed at the summit of roofs for decorative purposes. These instances seem to indicate a situation one would expect in a society where hydraulic structures formed a prominent feature of the landscape: the use of hydraulic terminology even in non-hydraulic contexts.

Professor Fernando has attempted to delve further into the etymology of the term *bisōkoṭuva* and, on the basis that its initial element *biso* was derived from the Sanskrit term *abhiṣeka*, suggested that there was a link between this structural element and the ceremony of royal consecration. He believed that this ceremony "would have taken place in close proximity to a sluice-cistern, thus giving rise to the name *bisōkoṭuva*."[43] In this context it may be remarked that, though etymological explanations could sometimes be quite useful, they could also be misleading. Any attempt to explain the meaning of a word in a particular historical context has to allow for the dynamic process of the change and expansion of the meanings of words. The contextual meaning, rather than the meaning traced etymologically, appears thus to be the more reliable basis of explanation. The most formidable objection to Fernando's explanation would be that no text

---

42. Paranavitana, *op.cit.*, pp.33 - 6.

43. Fernando, *op.cit.*, p. 105.

found in Sri Lanka attests to the ceremony of consecration being held within an irrigation reservoir. The *Vaṃsatthappakāsinī*, the commentary on the *Mahāvaṃsa*, describes in detail the ceremony of consecration, giving even such information as the places from which the clay was obtained to make various vessels necessary for this ritual. This text states that the ceremony was held in a pavilion specially built for the purpose.[44] Being aware of this difficulty, Fernando has suggested that this particular way of performing the ceremony of consecration went out of vogue quite early.[45] However, the commentary on the *Mahāvaṃsa*, which bases itself on the extremely ancient Sinhala commentarial texts preserved up to that time, is clearly presenting a picture of the consecration ceremony at an initial stage of the development of kingship in the island, and it even provides information on the symbols of chiefly power, the ceremonial staffs (*yaṭṭhi*) used by political leaders before the introduction of the ceremony of consecration into Sri Lanka.[46] On the other hand, the term *bisōkoṭuva* occurs for the first time only in the early medieval period of Sri Lankan history and, hence, the possibility that the word came into use only after the introduction of piston-type sluices appears to be quite strong.

The fact that the term *bisōkoṭu* was used to denote one element of the sluice while the term *rajamohol* was used to refer to a complementary element is of special significant and has to be taken into account in any attempt to understand the meanings of the terms. We have already noted that the latter term, which may be literally translated as "king's pestle", denoted the piston of the sluice that evidently bore a remarkable resemblance to a pestle. In the very same text where these two words occur together, the term *koṭu* has been used in the sense of "a receptacle for water".[47] Hence it seems quite appropriate to translate the term *bisōkoṭu* as "queen's receptacle". The use of such terminology to refer to the piston and its receptacle or the valve-housing is strongly suggestive of a

---

44. *Vaṃsatthappakāsinī*, ed. G.P. Malalasekara, London: Pali Text Society, Vol. I, 1935, pp. 305-7.

45. Fernando, *op.cit.*, p. 106.

46. *Vaṃsatthappakāsinī*, p. 406.

47. *Jātaka Aṭuvā Gāṭapadaya*, ed. D.B. Jayatilaka, Colombo: Lankābhinava, 1942, p. 126.

deliberate attempt to introduce a sexual metaphor and perhaps reflects earthy peasant humour. That such type of humour was not frowned upon in court circles and even in religious contexts in early medieval times is evident from the "elephant lamp" found inside the relic chamber of the Sūtigharacetiya at Dāḍigama. One may further add that there was perhaps also a more serious and noteworthy significance behind the use of these terms. The movement of the piston in and out of the valve-housing regulated the outflow of irrigation water vital for the fertility of the fields. For the rice-grower, the water they received from the reservoirs was a life-giving fluid. The terminology used for the parts of the sluice may reflect that they conceptualized the operation of the sluice as a royal act of procreation and, in doing so, they were probably drawing on the prevalent ideology which emphasised the association of kingship with fertility.

It will have been evident from the preceding discussion on the term *bisokoṭu* that the piston sluice, which was in widespread use in South India, was known to the Sri Lankans not merely as a description of a device found in the neighbouring subcontinent, but from actual examples in use within the country. The sluices at the Tissa reservoir and the Ātpokuṇa bathing pond described by Fernando appear to have belonged to this category. At the same time, it is particularly important to distinguish this type of sluice from the cistern sluice which was the most popular in Sri Lanka. On the basis of information from the cistern sluice from Gaṅgaikoṇḍa-cōḷapuram which has been remarkably well preserved, it is possible to suggest that, in place of the piston mechanism, some sluices of this type possessed a gantry arrangement with grooves enabling the insertion of two sets of slabs to close the sluice.[48] When the sluice is first opened with the reservoir at its full capacity, the topmost slabs would be removed and, as the level of water in the reservoir receded, the lower sets of slabs would be removed, one by one. If the size of each set of slabs were to be kept small, the operation of this type of regulating mechanism would not have been too cumbersome. The gantry divided the cistern into two parts. Initially, when the topmost slabs are removed, the effect would be to cause the water to cascade down from that part of the cistern which is closer to the water-

48. *Southeast Asian Studies*, vol. XXII, No. 2, 1984, pp. 125-131, 136-8.

face onto the outer part, thereby causing two miniature waterfalls inside the cistern, before flowing into the outlet conduits. This last feature is particularly noteworthy since it enables us to understand the significance of the information to be found in one of our sources.

An inscription discovered near the Batalagoḍa reservoir in the Kurunāgala District provides an account of the restoration of this reservoir by a general who lived in the last phase of the Polonnaruva kingdom. This general who was called Lak Vijaya Ābo Siṅgu dated his record in the fifth regnal year of Kalyaṇavatī, i.e. A.D. 1206, and stated that the reservoir had been breached in three places at the time he began its restoration. He further recorded that the *häli soro* had been destroyed. The general repaired the breaches, restored the *häli soro* and, since one sluice was inadequate, constructed a new second sluice which he named after himself.[49] Paranavitana who edited this inscription assumed that the term *häli soro* denoted "canals and sluice".[50] However, the usual term for canal was *äla*. Further, in the absence of a conjunctive between *häli* and *soro*, it would seem most likely that the first element qualifies the second and that the entire term denotes a specific type of sluice. It is particularly interesting to note that one of the most common meanings of *häli* was "cascade" or "waterfall".[51] And, if we accept this meaning, it would seem that the term *hälisoro* would be an apt description of the type of cistern sluice mentioned above. This descriptive term enables one to clearly distinguish this type of sluice from the piston sluice. Thus the sluice at the Batalagoḍa reservoir appears to have been a cistern sluice.

The cistern sluice and the piston sluice enabled the irrigation officials to carefully regulate the flow of water from the larger reservoirs, and the use of calibrated pillars set up inside

---

49. *me ... väva tun kaḍekin kaḍā hälisoro sun[bun]vä nopavat [vä] tubū kalhi me ba ... hälisoro lavā pavatva perāmä devāni sorovak näti heyin boho ket[vat no]pavat se däkä svabuddhīn [soro]bim balā sudusu bimak däkä etänhi taman namin adhikārasorovaya yana sorovak lavā. Epigraphia Zeylanica*, vol. IV, p. 79, lines 5-9.

50. *ibid.*, p. 81.

51. Välivitiyē Sorata, *Śrī Sumaṅgala Śabdakōṣaya*, Colombo: Anula Press, 1956, vol. II, p. 1121.

the reservoirs helped them to attain a certain measure of exactitude in the performance of this task. Evidently, the water requirements of an extensive area of fields were released when the sluices of a large reservoir were opened. A conservative estimate of the extent of the fields of the Isurumuni monastery for which water was released first would be about five hundred and seventy-seven acres.[52] The quantity of water needed for the cultivation of rice in these fields was stored in a smaller "distributory reservoir" from which the fields were fed as and when required. Such arrangements for releasing water from large reservoirs made it possible to decide more precisely on the quantity of water which would be allocated to each main tract of fields. Though one could suggest that storage of water in reservoirs of lower depth would have led to greater losses through evaporation, there were other economies involved in this type of distributory operation. Transport losses due to seepage were extremely high in ancient distributory systems which depended on unpaved canals, and such losses could be minimized by limiting the number of occasions on which the sluices of large reservoirs would be opened. A socially significant aspect of this system of water distribution was that the royal officials in charge of the larger reservoirs would be dealing primarily with such categories of persons as administrators of monasteries and owners of canals and smaller reservoirs who comprised an intermediate level of society rather than with the individual peasant as water-user. Except in the remoter villages where communal rights to irrigation works survived, the peasants were dependent on these intermediate groups for their supply of irrigation water and it was to these groups that they made the payments (*udakabhaga*, *dakabaka*, *dakapati*) in return.[53] While the lay intermediaries had to pay in turn for the water they received from the larger irrigation works owned by the king, the monasteries were generally exempt from such payments. These privileges that most monasteries enjoyed which ensured for them free access to sources of irrigation water were among the main factors behind the spectacular growth of monastic property during the period when hydraulic civilization flourished in Sri Lanka.

R.A.L.H. GUNAWARDANA

---

52. The fields were 144 *kiri* and 1 *paya* in extent. *Epigraphia Zeylanica*, vol. I, p.33, lines 15-6. For a discussion on the term *kiri*, see Gunawardana, *Robe and Plough*, p. 54.

53. For the significance of these terms, see L.S. Perera, "Proprietary and Tenurial Rights in Ancient Ceylon," *The Ceylon Journal of Historical and Social Studies*, vol. II, No. I, 1959, pp.1-36.