

Indus-Sarasvati Civilization

Written by Dr. S. Kalyanaraman
Update: 6th July 1995.

OBJECTIVE

The objective of this rather long monograph is to promote an understanding of and further researches into delineating the courses of the 'lost' Sarasvati river from Siwalik ranges to the Rann of Kutch (sAgara) and to gain deeper insights into an ancient civilization that flourished on the Sarasvati and Indus river valleys circa 3200 BC.

The intent is to circulate this to geologists and scholars interested in exploring further into the ancient cultures which flourished on the Sarasvati river – similar to those interested in exploring into the secrets of the tombs of the Pharaohs of Egyptian civilization.

Those who have further questions or inquiries can contact the scholars who have studied this subject deeply (e.g. Prof. Gregory Possehl, at Upenn and others mentioned in the bibliography). I shall be grateful to receive critical comments:

Dr. S. Kalyanaraman
20/7 Warren Road, Mylapore, Madras 600004 India
Tel. 011-91-44-493-6288; Fax. 011-9144-499-6380
EMAIL (till august 95): kalyans@ix.netcom.com

ORGANIZATION OF THE MONOGRAPH

The monograph is organized in five parts:

1. Analysis of archaeological and other evidence on the extent of the Indus-Sarasvati civilization in Indus-Sarasvati river valleys.

2. Extracts from bibliographical references (mainly Landsat imagery analysis and studies in earth sciences) providing leads to determining the course of the ancient, 'lost' Sarasvati river.

3. Rigvedic(Rk,Rca,or rk) hymns on Sarasvati.

4. The 'cult object' on Harappan seals

5. Frequently asked questions and some answers on this and related topics.

The monograph leads to a hypothesis which will require deeper studies to decipher the script used on seals and sealings found in many sites:

Indus-Sarasvati civilization flourished circa 2500 to 1700 BC on the river valleys of Indus and Sarasvati. The drying-up of the Sarasvati river led to migrations of people.

The search for the language of the times may have to be based on identification of the ancient morphemes, starting from a study of comparative morphemes (with similar sounds and similar meanings) of the present-day languages spoken in South Asia.

1. Analysis of archaeological and other evidence on the extent of the Indus-Sarasvati civilization in Indus-Sarasvati river valleys.

INTRODUCTION

I was pleasantly surprised to find in the National Atlas of India (Hindi), Calcutta, 1957, Govt. of India publication; Bharat-BhUracaNA map depicting Sarasvati-Ghaggar in dotted lines apparently to denote dried-up river beds!

Given the present state of archaeological knowledge gained since the Harappan site discovery in the 1920's, it's time to change the name of the maritime Harappan Civilization to INDUS-SARASVATI CIVILIZATION. The rationale for this suggestion based on locus, is provided and a number of research areas are proposed, for consideration by indologists:

Prof. Ahmad Hasan Dani writes (Ed. INDUS CIVILIZATION -NEW PERSPECTIVES, Quaid-i-Azam University, Islamabad, 1981, pp.3- 12): 'The Indus Civilization is today famed for its two cities of Harappa and Mohenjodaro ... Harappa ... its excavation also started as early as 1920-21 ... On comparing the material from the two places Sir John Marshall argued that the site of Harappa "will probably never prove so lucrative as that of Mohenjodaro, for the reason that it was further removed from the main centre of the Indus culture in Sind." (An. Rep. of the Arch. Survey of India, 1923-24, pp.47-48). He opined that this civilization "was developed in the Indus Valley itself and was probably as distinctive of that region, as the civilization of the Pharaohs was distinctive of the Nile." To him goes the credit of coining the term The Indus Civilization. But his geographic horizon no longer holds good and the term deriving therefrom is open to question The wide-spread nature of the Indus Civilization throughout Panjab and Sind had already expanded the meaning of the original term. Still later in the post-1947 period the Indus Civilization sites have been discovered in large number outside the present Indus region right up to the very borders of Yamuna in the north-east (Alamgirpur on the Hindon, a tributary of the Yamuna about 30 miles north of Delhi), along the dried-up bed of the river Ghaggar in northern part of Rajasthan, and in Gujrat right upto the mouths of Narbada and Tapti rivers'.

Harappa was a 'city' site; but the rivers had nurtured a large number of 'village' sites. I propose that on geographical grounds and based on the cumulative knowledge gained about this maritime civilization through the excavations of the decades since 1950's which have discovered that the culture spanned two great river valleys,

the name of this most extensive proto-historic civilization should be changed to INDUS-SARASVATI CIVILIZATION. This suggestion is made after careful, objective deliberation and introspection based on research pursued for over 20 years.

“Evidence from many sources, including that of archaeological remains associated with old river courses, indicates that a major river, stemming mainly from the same sources as the present Sutlej, flowed through Northern Rajasthan, Bahawalpur and Sind— to the southeast of the present course of the Sutlej and the Indus – in the third to second millennium BC. This river, known as the Sarawati in its upper course, at different times either joined the lower course of the Indus in Sind, or found its way independently into the Arabian Sea via Rann of Kutch.” (Allchin, B., Goudie, A., and Hegde, K., 1978, *The prehistory and palaeogeography of the Great Indian Desert*, London, Academic Press, p. 198).

Ghaggar which reached the Hakra branch in Bahawalpur, is traditionally identified with the Sarasvati river. [cf. Sir Aurel Stein’s explorations in the valley: *Ancient India*, no.5, 1949, pp. 12-30; A. Ghosh discovered 25 Harappan sites (*Indian Archaeology—a Review*, 1962-63) in the “region beginning right from the Pakistan border (eastwards) up to midway between Hanumangarh (bhatner or bhattinagara) and Suratgarh in the Sarasvati valley and about 25 kms. east of Bhadra in the Drishadvati valley”; Dr. Mughal discovered more than 300 sites in the Bahawalpur area]. Banawali excavated by Bisht is 15 km. northwest of Fatehabad, near the Sarasvati river and about 120 km. east of Kalibangan. Bhagwanpura, Dist. Kurukshetra, is located on the right bank of the Sarasvati river south of Rupar and is a site excavated by Joshi.

The archaeology of Indus-Sarasvati sites can be superimposed on the ancient geography of the region as gleaned from literary texts. That a script was used in this civilization can be linked to the name of a script used in historical periods in the region (without any apriori assumptions that the brahmi script is derived from this ancient script).

Vedic and epic tradition on the river is concordant with the archaeological/geographical (and now landsat satellite) attestations.

Etymologically, sarasvati means ‘abundance of lakes (saras)’. The synonym of sarasvatI (goddess of vAk = speech or language) is brahmi which is the name given to the early scripts used in asoka’s epigraphs of circa 300 B.C. .

The sUkta 6.61 of the Rigveda is a dedication to sarasvatI river; sUkta 75 is the nadi sUkta dedicated to sindhu river. The trio: drshadvati, Apaya and sarasvatI are extolled in Rk 3.23.4. Other Rks dedicated to the river are: 1.3.10, 1.3.11, 1.3.12, 2.30.8, 7.95.1, 8.21.17

and 18. References are made to yajnas performed by king citra on the banks of the river.[Apaya may be a branch of the Chitang river; this may also have yielded the sememe: ab, Ap = waters].

BaudhAyana’s DharmasUtra (I,1,2,9) describes MadhyadEsa as lying to the east of the region where sarasvatI river disappears, to the west of the black forest: kAlakavan, to the north of the pAripAtra mountain and to the south of the Himalayas.

MahAbhArata (BhIshmaparva, 6.49,50): seven divyagangas: nalinI, pAvanI, sarasvatI, jambu, sItA, gangA and sindhu. The epic locates kurukshetra to the south of sarasvatI and to the north of Drshadvati (iii,83,204). [This area is defined as Brahmavarta in Manu Smriti 2.17]. The doab formed by these two rivers thus becomes the locus of the Bharata war of kurukshetra (fought on five lakes: samanta- pancaka; said to be the northern sacrificial altar of brahma: MB, Vana, lxxxiii). [Alberuni found, in 1000 A.D., a holy lake in Kurukshetra]. The epic provides an account of Balarama’s sojourn along this river dotted with centers of learning and austerities. [The dividing line of Drshadvati is at Chunar near Varanasi; the modern name is Rakshi].

The dried-up bed – wadi – of sarasvatI might have constituted the great road between hastinapur and dvArAvati (dwaraka). Part of this road would have constituted the road from Sind to Delhi via Bahawalpur, Marot, Anupgarh, Suratgarh, Dabli, KalibaggAN, Bhatner (Hanumgarh), Tibi and Sirsa suggested by Major F. Mackeson in 1844 to the British government (Report on the Route from Seersa to Bahawalpore, JAS BENG., XLII, Pt.I, 1844, No. 145 to 153)]. A synonym of Sirsa is sarsuti; sarasvatI; at this place, about 100 miles below Rassauli, a fortress was built.

Hieun Tsang’s reference to ‘five indies’ is amplified by Cunningham to define northern India to comprise the Punjab proper including Kashmir and the adjoining hill states, eastern Afghanistan beyond Indus and the Sutlej states to the west of the sarasvatI river.

Geographically, the sarasvatI basin can be traced to the currently known: ghaggar-nALI-hakDA-rainI-nArAwAhinda- mihrAn-purAN channels. Ghaggar might have been a stream that rose in the Siwaliks and that joined the sarasvatI. This network runs parallel to the Indus across Sind. The river flowed from the Himalayas to the Rann of Kutch. [cf. Oldham, C.F., JRS, 1893, p.49 on the Lost river of the Indian desert; Sir A. Burnes, Memoir on the Eastern Branch of the River Indus, given an Account of the alterations produced on it by an earthquake, also a Theory of the formation of the Runn, TRANS. RAS, III,1834, pp. 550-88].

Geologically, the entire sarasvatI river bed, and the arm of the Arabian sea (formerly spanning into saline Ranns of kutch) into which the river fell are on an earth-

quake belt; an earthquake could have upraised this entire river-sea-bed profile, drying up the river. [This may explain the formation of the Thar desert on the left banks of the river in earlier earthquakes; also, perhaps of the Thal desert in Pakistan. Did some tracts of the thar desert support cultivation in ancient times? Geological surveys do indicate subsoil water in some tracts. Even today, over 2 million people in Rajasthan live in these tracts! The Sanskrit name is maru-sthal. cf. Tamil maruta-nilam??].

Was this event of the dried-up sarasvatI linkable to the 12 years of drought in the Santanu reign – an anecdote in the Mahabharata? Could this explain the migrations of the Indus-Sarasvati people to other parts of the sub-continent?

Another possibility is that the head-waters of sarasvatI were captured by sutlej (sutudrI) shrinking the water-volume carried by sarasvatI. [cf. H.Raychaudhari, The Sarasvati, in Science and Culture, VIII, 12, June 1943; Studies in Indian Antiquities, Calcutta University, 1958, pp. 121-41]. Yamuna is also considered a tributary of the sarasvatI (Wadia, D.N., Geology of India, London, 1949, p.41).

Could the Indo-Aryan migrations, attested in a number of scholarly studies, have been caused by the (gradual?) drying-up of the river?

Linguistically, was this IndusSarasvati a region which had synthesized the Indo-Aryan (Gypsy, Dardic, Panjabi, Gujarati), Dravidian (Brahui, Tamil) and Munda language streams, before internal migrations began circa 1700 B.C.? Was this a south asian linguistic area, circa 2500 B.C.? In the lingua franca, was the river called khal = stream (Tamil)? [khAyal (Malayalam); khADI (Gujarati); khAl (Hindi)]? Was drshadvati like gangA, a term absorbed from Munda? [The absorption of the Dravidian retroflex sounds render the Indo-Aryan tongues to be distinct from the IE; also, cf. references to Indian sememes in Turner's comparative indo-aryan dictionary and my south asian dictionary].

What are the dates of the formation of the Rann of Kutch? What are the dates of the drying-up of the Sarasvati river? Do the vivid landsat pictures of the lost river skirting the Indian desert convey enough information to unravel the geological causes of the drying-up?

Maybe, further researches to firm up these dates will hold a clue to unravel the apparent discontinuity between IndusSarasvati proto-historic culture (circa 2500-1700 B.C.) and the linguistic evidence of the historical periods (circa 300 B.C.) of the region. [Recent excavations in Banawali and Dholavira seem to establish the continuity of settlements bridging this apparent gap between circa 1700 and 300 B.C. belying some theories about the abrupt disappearance of the Harappan tradition, say, caused by floods on the Indus?]

2. Extracts from bibliographical references (mainly Landsat imagery analysis and studies in earth sciences) providing leads to determining the course of the ancient, 'lost' Sarasvati river.

The following extracts, principally from principally earth sciences and LANDSAT literature establish the existence of Sarasvati river contiguous to the Indus river valley and the area of Rann of Kutch and the Gulf of Cambay in Gujarat. This region is studded with many Harappan culture sites.

BACKGROUND

Harappa is a site on the west bank of Ravi; Kalibangan is a site on the right bank of Sutlej; Amri is a site on the west bank of Indus (close to the Arabian sea); Banawali is located 15 km northwest of Fatehbad, near the Sarasvati river and about 120 km east of Kalibangan; Lothal and Rangpur are sites below the Rann of Kutch.

LANDSAT PHOTOGRAPHS ANALYZED

Bimal Ghose et al (1979) use photographs taken in 1972. Plate V traces the wide valley of the Sarasvati running from Suratgarh through Anupgarh to Fort Abbas and Ahmadpur East. From Anupgarh another wide belt of discontinuous patches of dark grey tone runs southwestward upto Sakhi. From Sakhi, the remnant of a former valley can be traced towards the west ... the imagery reveals the presence of a narrow zone of saline/alkaline fields, partly obliterated by the overlying sand dunes, extending upto Khangarh. To the south of Khangarh, a narrow strip of green vegetation, producing a slightly darker tone than the surroundings, can be identified. It runs from Islamgarh, through Dharmi Khu, Ghantial, Shahgarh, Babuwali and Rajar to Mihal Mungra. This was the course of the Sarasvati from the Himalaya to the Rann of Kutch after the river severed relations with Luni. South of Mihal Mungra, the course could be traced up to the present Hakra channel and there are indications of its having even crossed the Hakra channel (Plate VI). This signifies that the course of the old Sarasvati might have been somewhere to the west of the present Hakra ... The other major courses of the Sarasvati could be identified further to the west, through Mithra and Sandh, the remnants of which are now known as the Raini and the Wahindaa rivers. Here also the river shifted its course several times, and, at one time, flowed to the east of the Wahinda river, through Mundo. Finally, the river ceased to flow southward and met the Sutlej to the west of Ahmadpur East.

Ramasamy, Bakliwal and Verma (1991) show satellite photographs mosaiced, planimetrically controlled ... Figure 1 show the last tongue of the Sarasvati river ... The study of remotely sensed data in the desert tract

of Rajasthan shows that there are plenty of paleochannels with well sprung-up tentacles throughout the desert (figure 3). On the northern edge of the Thar-Great Indian desert at the Ganganagar-Anupgarh plains a well-developed set of paleochannels are clearly discernible in satellite photographs (figures 1 and 4). Bakliwal et al (1988) have explained that these well sprung-up paleochannels are traces of the mighty Saraswati river which once ruled the desert. Yashpal et al (1980) have argued that the paleochannels observed in the Anupgarh plains are the arm of the Saraswati river, which has been displaced by the present day Gaggar river ... that the Saraswati river once flowed close to the Aravalli hill ranges and met the Arabian Sea in the Rann of Kutch, that it has migrated towards the west, the north-west and the north and has ultimately got lost in the Anupgarh plains ...

Yash Pal et al (1980) present in Figure 3 a synoptic view provided by the Landsat of the northwestern Indian subcontinent showing 6-8 km wide paleochannel of the Saraswati ... ; Figure 4 shows the old bed of the Saraswati river ... Figure 7 shows a synoptic view of the Indus valley showing possible course of the Saraswati beyond Marot through the Nara into the Rann of Kutch ...

RING STONES IN GULF OF CAMBAY IN ANCIENT TIME

Alex Rogers, 1870. A few remarks on the Geology of the country surrounding the Gulf of Cambay in Western India, Quarterly Journal of Geological Society of London, 26: 118-124 who was perhaps among the earliest observers of the geology of the Gulf of Cambay (close to Lothal), points out that from the geological formation of the country bordering on the Rann, it appeared that the drainage of the PanjAb once flowed into it:

“ ... The rapid silting up of the Gulf of Cambay gives particular interest to an inquiry into the geological conditions which probably shaped it in remote ages ... (The head of the Gulf) comprises within itself the Great Runn of Cutch ... primary or metamorphic rocks are traceable in its immediate vicinity only in a small tract on its west coast ... even the highest points of the granite peaks show signs of weathering, and probably also of the erosive action of waves ... Many considerations point to the existence in former aagers of some large river flowing down from the north, and falling into the Indian Ocean somewhere in the position of the present Gulf of Cambay: and it is not improbable that that river may have been the Indus. It may have been that the original course of the Indus from the Punjab was in a more south-easterly direction than that of the present day ... (In this Gulf), coinciding to a large extent with the black-soil belt, there can be clearly traced a natural depression in the surface of the country for some twenty miles from the head of the Gulf, terminating in a shal-

low lake of brackish water called the Null ... Shells of the genus CERITHIUM, an estuarine form, are found lying loose in the black soil many miles from this point (Bhogava); and the records of the old Revenue Survey of Goozerat state that there were formerly found in the Null large stones with holes through them, which had evidently served as anchors for boats of some size ... [cf. the ring stones found in Mohenjo-daro] ... there is historical and well-know proof of the alteration of the level of the larger of these salt flats as the consequence of an earthquake in AD 1819 ... only a much more violent action would have separated the laterites of the high and low levels ... this rock, again, appears at precisely the same level on the opposite sides of valleys in the Concan and Deccan, giving ample proof of dunudation ... at the time (some of the Vedas) were composed, the Suruswuttee, the most easterly of the Punjab rivers, which now loses itself in the desert of Rajpootana, flowed into the Indian Ocean. This confirms to some extent the theory of the case of the alluvial deposit at the head of the Gulf of Cambay.”

Raverty, H.G. Major, Bombay Army, 1893, The Mihran of Sind and its tributaries: a geographical and historical study, Journal of Asiatic Society of Bengal, Vol. lxi, Pt. 2, pp. 155-297:

“ ... to notice some of the numerous fluctuations in the courses of the Sindhu, Ab-i-Sind, or Indus, and of the rivers of the Panj-ab. The changes in the courses of two of these rivers, together with the drying up of the Hakra, Wahindah, or Bahindah were so considerable that they reduced a vast extent of once fruitful country to a howling wilderness, and thus several flourishing cities and towns became ruined or deserted by their inhabitants ... the old course of the Biah, or ‘Bias’ previous to its junction with the Sutlaj, when both rivers lost their names and became Hariari, Nili or Gharah ... why the army of Islam marched along the bases of the mountains, for the route was long, and the way by Sasruti and Marut was nearer? He (Mangu Khan) was answered that the numerous fissures on the banks of the river rendered the way impossible for the army ... Sarasti is the ancient name of Sirsa: Sursuti is the name of a river, the ancient Saraswati ... Sutlaj was a tributary of the Hakra or Wahindah ... Hakra ... appears to be the modified form of Sagara, the letter S being pronounced H in Rajputana and Sindh ... Sagar is the Sanskrit for ‘ocean’, ‘sea’ etc., and it is still known as the Sind-Sagar near the sea coast. Tod calls it the ‘Sankra’, which is another form of the name; and it is called Sankrah in the treaty entered into by Nadir Shah, and Muhammad Shah, Badshah of Dihli, when ceding all the territory west of it to the Persians ... Hakra did once run through the so-called ‘Indian Desert’ ... Ghag-gar, the Sursuti and the Chintang were also the tributaries of Sind-Sagar or Wahindah

or Hakra ... Mansuriyat ... this city is situated among the branches of the Mihran river, and from that place the river unites with the ocean by two channels. One is near the town of Loharanj, and the other bends round towards the east in the confines of Kaj (Kachch) and is called the Sind Shakar (Sind-Sagarah) which means the The Sea of Sind. The river Sarasat unites with the ocean to the east of Suminath. This last names river is, of course, the Saraswati, which falls into he sea near Pattan Som-nath, not the classical river, the tributary of the Ghag-ghar, described farther on, the sacred river of the Brahmans ... At Thatha the Sind is called Mihran ...”

Leshnik, Lawrence S., 1968, The Harappan Port of Lothal: Another View, *American Anthropologist*, 70, 1968, pp. 911-921:

“ ... The Volkerwanderung that brought the Harappans to Lothal (2450 BC) is conceived of as a sea passage from the Indus ... This dating is, however, questionable and exploration of the Kutch area has brought to light a number of Harappan sites there (Joshi, J.P. 1966, Exploration in Northern Kutch, *Journal of the Oriental Institute, Maharaja Sayajirao University of Baroda*, 16: 62-67), so the arrival- by-sea theory will have to be reconsidered ... In Mohenjo-daro there is a linear representation of a man using the shaduf, so that its presence is documented for the Harappan civilization as well ... Marshall describes the Mohenjo-daro ringstones as having slots that were used to fasten stones to something that passed through the central aperture. This could have been the arm of a shaduf, to which the stone weights were lashed by rope or leather thongs. The shaduf is still employed near Lothal, although the stones are no longer pierced, but simply secured with rope. Pierced stones continue however to be used in this way in Eastern India ... A note on the Lothal tank as an irrigation reservoir ... ”

R.D. Oldham, 1886, On probable changes in the geography of the Punjab and its rivers - a historico-geographical study, *J. Asiatic Soc. Bengal*, 55: 322-343:

“ ... we have now seen that a dry river bed can be traced, practically continuously, from Tohana in Hissar district to the Eastern Narra in Sind ... ”

C.F. Oldham, 1893, The Saraswati and the lost river of the Indian Desert, *Journal of the Royal Asiatic Society*, pp. 48-76:

“ ... local legends assert (that Sarasvati) once flowed through the desert to the sea. In confirmation of these traditions, the channel referred to, which is called Hakra or Sotra, can be traced through the Bikanir and Bhawalpur states into Sind, and thence onwards to the Rann of Kach ... attested by the ruins everywhere overspread what is now an arid sandy waste. Throughout this tract are scattered mounds, marking the sites of cities and

towns. And there are strongholds still remaining ... Amongst these ruins are found, not only the huge bricks used by the Hindus in the remote past, but others of a much later make ... Freshwater shells, exactly similar to those now seen in the PanjAb rivers, are to be found in this old river-bed and upon its banks ... After entering Sind the Hakra turns southward, and becomes continuous with the old river-bed generally known as Narra. This channel, which bears also the names of Hakra or Sagara, Wahind and Dahan, is to be traced onward to the Rann of Kach ... Tha Hakra varies in different parts of its course from about two to six miles in width, which is sufficient for a very large river ... The only river near Marot was the Hakra ...

LOST COURSES OF THE SARASVATI

Bimal Ghose, Amal Kar and Zahid Husain, 1979, The lost courses of the Sarasvati river in the Great Indian Desert: New evidence from Landsat Imagery, *Geographical Journal*, 145: 446-451:

“Interpretation of LANDSAT imagery and field investigation in the western part of Jaisalmer district in India have revealed some hitherto unknown abandoned courses of the former Saraswati river. It has been suggested that these courses were alive before the Saraswati occupied the Raini or the Wahinda courses, and contributed to the alluviation of the region. The subsurface water in the region is contributed mainly by the Himalayan precipitation flowing subterraneously through the former courses of the Saraswati ... ”

RIVER MIGRATIONS IN WESTERN INDIA

Ramasamy, SM, PC Bakliwal and RP Verma, 1991, Remote Sensing and River migrations in Western India, *Int. J. Remote Sensing*, Vol. 12, No. 12, 2597-2609:

“The art of remote sensing has opened up many vistas in the study of river migration as satellite photographs, both in their normal and digitally enhanced modes, vividly show the rivers and their migratory signatures. The rivers migrate for various reasons amongst which tectonic movement is one of the main causes ... The study has shown that Western India sows considerable signs of Quaternary tectonics ...

“ ... (Landsat photographs, on a 1:1 000 000 scale) ... the palaeochannels were interpreted, as exhibiting linear, curvilinear and loop-like features with typical black ribbon-like stripes ... The Landsat imagery studies show that the Indus river has a very wide flood plain on either side of its course up to a maximum width of 100-120 km in the east and south-east. To have such a wide flood plain on only one side shows that the Indus river has preferentially migrated towards the north-west in the northern parts and towards the west in the central and southern parts. The study of remotely sensed data in the desert tract of Rajasthan shows that there

are plenty of paleochannels with well sprung-up tentacles throughout the desert. On the northern edge of the Thar-Great Indian desert at the Ganganagar-Anupgarh plains a well-developed set of palaeochannels are clearly discernible in satellite photographs. (Bakliwal PC, Ramasamy, SM, and Grover, AK, 1983, Use of remote sensing in identification of possible areas for groundwater, hydrocarbons and minerals in the Thar desert, Western India, Proceeding volume of the International conference on prospecting in areas of desert terrain. The Institute of Mining and Metallurgy Publications, 14-17 April, Rabat, Morocco, 121-129) have explained that these well sprung-up palaeochannels are traces of the mighty Saraswati river which once ruled the desert (these and) the present study show clearly that the Saraswati river once flowed close to the Aravalli hill ranges and met the Arabian sea in the Rann of Kutch, that it has migrated towards the west, the north-west and the north and has ultimately got lost in the Anupgarh plains ...

“ ... When the Aravalli hills are traced back to the foothills of the Himalayas the water divide of the Yamuna and Saraswati rivers becomes apparent. Hence, it follows that the drifting of the Saraswati river from its easterly flow towards the Great Indian Desert would have been initiated by such a rise in the Aravalli mountains and that due to the subsequent Luni-Sukri cycatogenic arching, the Saraswati migration towards the north-west would have been accelerated ...

“ ... it seems that climatic changes have also played a subordinating role in shifting the (Saraswati) river towards the north. When the Saraswati flowed in a south-westerly direction it was flowing against the northeasterly moving sand advance in the Thar desert. It can be concluded, therefore, that the Saraswati river could not overcome such a sand advance and hence that it started drifting towards the north with a rotational migration in a clockwise direction until ultimately it was buried in the Anupgarh plains ... ”

P.C. Bakliwal and A.K. Grover, 1988, Signatures and migration of Saraswati river in Thar desert, Western India, *Rec. Geol. Surv. Ind.*, 116: Pts. 3-8, pp. 77-86:

“ ... Remote sensing study of the Great Indian Desert reveals numerous signatures of palaeochannels in the form of curvilinear and meandering courses with feeble to contrasting tonal variations. The Saraswati river, which is believed to be lost in the desert, could be traced through these palaeochannels as a migratory river. Its initial course flowed close to the Aravalli ranges and successive six stages took west and northwesterly shifts till it coincides with the dry bed of Ghaggar river. The groundwater, archaeological and pedological data with selected ground truths also corroborate these findings. The migration of river Saraswati seems to be caused by

tectonic disturbances in Hardwar-Delhi ridge zone, Luni-Surki lineament, Cambay Graben and Kutch fault facilitated by contrasting climatic variations. The stream piracy by Yamuna river at later stage is responsible for the ultimate loss of water and drying up of the Saraswati river ... “

SECRETS OF THE THAR DESERT

Singhvi AK and Kar, Amal eds., 1992, Thar Desert in Rajasthan: Land, Man and Environment, Bangalore, Geological Society of India, Bangalore:

“ ... In the south it (Thar desert) has a sharp natural boundary with the world's largest saline waste - the Great Rann of Kachchh, while in the north the riparian sub-Himalayan plains define its boundary ... Quaternary continental sediments in the Thar desert of Rajasthan comprise a succession of fluvial, fluvio-lacustrine and aeolian deposits ... The neogene tectonic movements ... are considered as responsible for controlling the origin, configuration and development of basins of deposition ... Occurrence of aligned earthquake epicentres of different dates from 1879 to 1976 AD along it (Luni-Sukri lineament from the Rann to the Sambhar lake) in the Kachchh area suggests its neotectonic potentiality ...

“ ... The dry bed of the Ghaggar is conspicuous on the satellite imagery of north Rajasthan and adjoining parts of Pakistan as a continuous wide belt running through Suragarh and Anupgarh in India to Fort Abbas and Ahmadpur East (in Pakistan) [(Ghose et al., 1979, The lost courses of the Saraswati river in the Great Indian Desert - new evidence from Landsat imageries, *Geographical Journal*, 145 (3): 446-451); Bakliwal, PC and Grover, AK, 1988, Signatures and migration of Saraswati river in Thar desert, western India, *Rec. Geol. Surv. India*, 116 (3-8)]. Some south-flowing earlier courses of this stream were detected through the western part of Jaisalmer district and in the Bikaner-Sardarshahr tract further east. Buried courses of another Himalayan stream, R. Drishadvati (which was also a tributary to the Saraswati) were found in the Churu-Nagaur tract. The rivers had several tributaries joining them from the Aravallis and other rocky areas within the desert. Recent SEM analysis of the Quaternary sediments of the northeastern part of the desert indicate considerable glacial, as well as fluvial, transport of some of the sediments [Raghav, KS, 1991, Quaternary history of a part of the northeast fringe of the Thar desert of India, *Ann. Arid Zone*, 30(4)]. The survival of the Saraswati-Drishadvati courses depended to a large extent on the perennial supply of water from the mightier Sutlej (the Satadru of Vedic literature) which shifted its course several times in the sub-Himalayan plains due to neotectonism, change of grade etc. (Valdiya, KS, 1989, Neotectonic implication of collision of Indian and Asian plates, *Ind. J. Geology*, 61: 1-13). A detailed account of former streams in

the region is provided by Kar (Kar, A., 1992, Drainage desiccation, water erosion and desertification in north-west India, in: Desertification in the Thar, Sahara and Sahel Regions, AK Sen ed., Scientific Publishers, Jodhpur). Some of the buried stream segments are potential ground water aquifers.. The course of the Saraswati to the west of Jaisalmer has an estimated reserve of about 3000 mcm water awaiting a judicious exploitation ...

“ ... Mughal M.R. (1982, Recent archaeological research in the Cholistan desert, in: Harappan Civilization, GL Possehl, ed., Oxford, pp. 85-95) has located a large number of settlements of the Hakra Ware culture, dating to the fourth millennium BC., and of the Harappan culture, dated to the third millennium BC, on this (Ghaggar-Hakra) river in Pakistan. Nearly two hundred settlements of the Harappan culture have been located by Indian archaeologists on the Ghaggar river and its tributaries in Punjab, Haryana and northern Rajasthan [Ghosh, A., 1952, The Rajasthan Desert - its archaeological aspect, Bulletin of the National Inst. Sci., I : 37-42; Bhan, S., 1973, The sequence and spread of prehistoric cultures in the upper Saraswati basin in: Radiocarbon and Indian Archaeology, DP Agrawal and A. Ghosh eds., TIFR, Bombay, pp. 252-263] ... Kalibangan was abandoned at the beginning of the second millennium BC., probably due to the drying up of the river and shifting of the Sutlaj away from it (Lal. B.B., 1979, Kalibangan and Indus civilization, in: Essays in Indian Protohistory, DP Agrawal and DK Chakrabarti eds., BR Publ., Delhi, pp. 65-97).

Bhan, Suraj., 1973, The sequence and spread of prehistoric cultures in the upper Saraswati basin in: Radiocarbon and Indian Archaeology, DP Agrawal and A. Ghosh eds., TIFR, Bombay, pp. 252-263

“ ... The Kalibangan I culture (c. 2300 - 2100 BC) ... The Siswal A ware was recovered from 16 sites in the south-western part of Haryana adjoining northern Rajasthan. It extended to Jind and Paoli in the north-east. The comparative preponderance of the ware in the Drsadvati valley suggests the preference of the pre-Harappan folk for smaller river valleys as in north Rajasthan ... But the absence of the Late Harappan ware from north Rajasthan and the adjoining regions o Haryana (south of Vanawali near Fatehabad in the Saraswati valley and Alipur Kharrar near Hansi in the Drsadvati valley) suggests the survival of the Harappa culture in our region (as also in the north-eastern Panjab and western UP), after the lower and mid zones of the Saraswati basin had been deserted. The desertion of the semi-arid zone of north Rajasthan and Bahawalpur by the Harappans or the Harappa-influenced kindred folks, and their subsequent expansion further north-east seems to have been forced by the growing desiccation of the Saraswati basin consequent upon the changes in

the courses of the Saraswati, Drsadvati and the Yamuna rivers. It was this second phase of the Harappan expansion which was largely responsible for the colonization of the ancient Madhya Desa which ensued with the settlements of Daulatpur I, Alamgirpur I etc ... With more than 90 OCP or Late (degenerate) Harappan sites reported from the doab it would be difficult to agree with Agrawal (1967-68) that the doab was first colonized by the iron-using PGW people.”

Yash Pal, Baldev Sahai, R.K.Sood and D.P. Agrawal, Space Applications Centre, and PRL, Ahmedabad, 1980, Remote sensing of the ‘lost’ Saraswati river,; Proc. Indian Acad. Sci. (Earth and Planetary Sci.), Vol. 89, No. 3, Nov. 1980, pp. 317-331:

“ ... delineation of the palaeochannels of the Satluj, the Yamuna and the Ghaggar to trace the ‘lost’ Saraswati. Study of Landsat imagery shows that the Satluj once flowed into the Ghaggar; it is also probable the Yamuna too was flowing into the Ghaggar river at the same time. The bed of this river is traceable upto Marot, from where it is likely to have extended through Hakra/Nara bed to the Rann of Kutch. The present dried bed of the Ghaggar was thus part of a major river, anciently known as Saraswati. Analysis of satellite imagery supports the above hypothesis regarding the course of the ‘lost’ Saraswati ...

“ ... Satluj and Yamuna are perennial rivers ... the rivers Ghaggar, Saraswati, Markanda and Chautang all rise from the Siwalik Hills and are non-perennial. They flow mainly during the monsoon. At present none of them reaches the sea or joins any major river as a tributary ...

“ ... The sharp westward right-angled bend in the course of Satluj is suggestive of its diversion in the past, as at the point of river capture or stream diversion similar elbows develop ... There is a sudden widening of the Ghaggar Valley about 25 km. south of Patiala ... can be explained only if a major tributary was joining Ghaggar at this place. The satellite imagery does show a major palaeochannel joining the Ghaggar here ... Our observations are supported by the field data of Singh (Gurdev Singh, 1952, The Geographer, 5,27) who mentions a channel starting near Ropar and leading towards Tohana (29.35N, 75.55E). The area along this old course of the Satluj is called ‘dhaia’ meaning an upland or high bank ... It might have required only a little tectonic movement to disturb its previous course and force it into its present channel ... Our studies show that the Satluj was the main tributary of the Ghaggar and that subsequently the tectonic movements may have forced the Satluj westward and the Ghaggar dried. Wilhelmy (H., 1969, Z. Geomorphol. Suppl., 8, 76) considered ... the second alternative, i.e., river capture. The Satudri (Satluj) might have been a tributary of the Vipasa

(Beas) and through headward erosion captured the waters of the river coming down the Himalayas near Ropar. Tectonic movements may have aided the river capture ...

“ ... the Landsat imagery of the Indus system and it appears that the confluence of the Satluj with the Indus may not be an ancient feature. The palaeochannel of the river Beas, which is quite conspicuous in Landsat imagery, joined the Indus independent of the Satluj. There is a distinct palaeochannel which seems to suggest that the Satluj flowed through the Nara directly into the Rann of Kutch ...

“ ... The ancient bed of the Ghaggar has a constant width of about 6 to 8 km. from Shatrana in Punjab to Marot in Pakistan. The bed stands out very clearly having a dark tone in the black-and-white imagery and reddish one in false colour composites. There is a clear palaeochannel southeast of the river Markanda which joins the ancient bed of the Ghaggar near Shatrana ... Another channel which corresponds to the present Chautang (Drishadvati) seems to join the Ghaggar near Suratgarh. Near Anupgarh the ancient Ghaggar bed bifurcates and both the palaeochannels come to an abrupt end; the upper one terminates near Marot and the lower one near Beriwalla. These two terminal channels of the Ghaggar seem to disappear in a depression which is suggested by salt encrustation and the physiography of the area ...

“ ... Palaeo-Yamuna was alive during the Painted Grey Ware (PGW) period (c. 800-400 BC) as indicated by the distribution of the PGW sites on its banks (Gupta SP et al., 1977, Ecology and archaeology of Western India eds. DP Agrawal and BM Pande, New Delhi, Concept Pub., p. 79). Both the Chautang and the Ghaggar beds have archaeological mounds on their banks (Pande BM, *ibid*, p.55). The Ghaggar continued to be a live river during the pre-Harappan (c. 2500-2200 BC) and the Harappan times (c. 2200-1700 BC). Even during the PGW times, there is some indication of habitation along the palaeochannel, though the PGW mounds follow a very narrow river bed, perhaps indicating a dwindling water supply. The archaeological evidence for dating the Chautang is not very definite yet, though the late Harappan mounds along it appear to be a clear indication that it was a living river during at least the late Harappan time (c. 1700-1000 BC) ...

“ ... For miles and miles around Marot one finds numerous place names with a suffix toba, which in the local language means a playa (or rann) ... It is obviously improbable for such a mighty river to vanish into a shallow depression (or khadins in the local languages) in its heyday. There is, therefore, a good possibility that the Ghaggar flowed into the Nara and further into the Rann of Kutch without joining the Indus ...

“ ... If the bore-hole samples from these areas are analysed, one is sure to come across mineralogical compositions reflecting the signatures of the ancient Satluj and the Palaeo-Yamuna when they flowed through the Sarasvati bed ... A multidisciplinary approach employing archaeological, mineralogical, chemical and thermoluminescence, combined with remote sensing techniques can provide a clear and consistent history of these changes in the palaeochannels of northwestern sub-continent in an absolute time-frame.”

R.L. Raikes (a hydrologist) and R.K. Karanth (a geologist) found at Kalibangan (in 1967) through a drilling program, that at a depth of 11 m. below the present flood-plain level, a coarse, greyish sand very similar in mineral content to that found in the bed of the present-day Yamuna. It extended over a width at least four times that of the bed of the present-day Yamuna and down to a depth, at one point at least, of 30 m. ... the material in short is typical flood-plain deposit of the kind being laid down today at a rate of about 2 m. per thousand years. (R.L. Raikes, 1968, Kalibangan: Death from Natural causes, *Antiquity*, 42, pp. 286-291).

CLIMATE CHANGE

Gurdip Singh, 1971, *Archaeology and Physical Anthropology in Oceania*, 6, 177-189: The Indus Valley Culture seen in the context of post-glacial climatic and ecological studies in North-West India: suggests that “ ... the significant increase in rainfall at the beginning of the third millennium BC, attested by palaeoecological evidence, played an important part in the sudden expansion of the Neolithic-Chalcolithic cultures in north-west India, ultimately leading to the prosperity of the Indus culture ... The present evidence would suggest that the onset of aridity in the region around 1800 BC probably resulted in the weakening of the Harappan culture in the arid and semi-arid parts of north-west India ... ”

Amal Kar and Bimal Ghose, 1984, *Geographical Journal*, The Drishadvati river system of India: an assessment and new findings, 150: 221-229:

“ ... there are indications that the river formerly flowed southwards, through the desert, and was supplied from streams originating in the Aravallis, thus explaining the distribution of alluvium in the region ... Drishadvati ... means a stream with a pebbly bed ... The interfluvium between the Saraswati and the Drishadvati used to be known as Brahmavarta and was sacred ... Sir Alexander Cunningham (1871, *The ancient geography of India*, repr. 1979, Indological Book House, Varanasi) first identified the Drishadvati with the modern Rakshi ... ”

Aurel Stein, 1942, A survey of ancient sites along the ‘lost’ Sarasvati River, *Geographical Journal*, 99: 173-182:

“ ... the sketch-map based on the latest survey shows

how great is the contrast between the very scanty volume of water brought down by the Ghaggar and the width of its dry bed within Bikaner territory; over more than 100 miles it is nowhere less than 2 miles and in places 4 miles or more. This bed is lined on both sides by dunes varying in height ... the Ghaggar bed above Hanumagarh, one notes that the number of mounds marking ancient sites long abandoned is here distinctly smaller than farther down the old river bed ... (mounds) known as ther or theri ... Archaeological facts prove cultivation, and with it settled occupation, to have been abandoned much earlier on the Hakra than on the Ghaggar ... trial excavation at Sandhanawala Ther, 3 miles to the north-west of Fort Abbas ... some serds with incised characters which appear on many inscribed seals from Mohenjodaro and Harappa, chief sites of the Indus Valley culture ... The great height and size of several thers indicate prolonged settlement ... the evidence shows that down to historical times the Ghaggar carried water for irrigation under existing climatic conditions much farther than it does now. This makes it intelligible how the Sarasvati has come in hymns of the Rigveda to be praised as a great river ... upper portion of the ancient bed ... drying up during historical times ... hastened by diversion of flood water for irrigation brought about by more settled conditions and the resulting pressure of population. Lower down on the Hakra the main change was due to the Sutlej having in late prehistoric times abandoned the bed which before had joined the Ghaggar: the result of a law affecting all rivers whose course lies over alluvial plains ...

D. A. Holmes, 1968, The recent history of the Indus, Geographical Journal, 134: 367-382:

“.. Lambrick (H.T., 1967, The Indus Flood-plain and the ‘Indus’ civilization, Geographical Journal, 133,4: 483-95) believes that the union of the Sutlej with the Beas (and thence with the Indus) in the West Punjab had already occurred prior to the time of Alexander. It must be assumed that the Nara was continuing to flow as a result of seasonal overspill from both the Indus and the Sutlej, the latter floods using the now dry Ghaggar channel (which is a remnant of the Sutlej-Nara system) ... ”

3. Rigvedic(Rk,Rca,or rk) hymns on Sarasvati.

The Rigvedic(rk) sources which refer to Sarasvati river are as follows:

yastE stanah SaSayo yo mayobhUyemna viSvA pushyasi vAryANi yo ratnadhA vasuvidyah sudatrah sarasvati tamiha dhAtave kah (RV 1.164.49)

Oh Sarasvati offer that breast of yours for our nourishment here which is on your body, which spreads happiness by which you nourish (those who praise you) with all the choicest things, the one which holds all the beautiful things, which knows the enemies’ wealth and which offers good gifts.

pAvakA nah sarasvatI vAjebhirvAjinIvatiI yajnam vashTu dhiyAvasuh (RV 1.3.10)

May Sarasvati be our purifier may she who holds food offer us food, the holder of wealth may desire yajna.

cOdayitrI sUnrtAnAm cetantI sumatInAm yajnam dadhe sarasvatI (RV 1.3.13)

The Sarasvati inspirer of good acts and good thoughts holds yajna.

maho arNah sarasvatI pra cetayati ketunA dhiyO viSvA vi rAjati (RV 1.3.12)

Sarasvati is known, by the flag (course) of great water. All prayers shine very much.

sarasvatI tvamasmAmaviDDhi marutvatIjeshi SatrUntyam cicchardhantam tavishIyamANamindro hanti vrshabham SaNDikAnAm (RV 2.30.8)

Oh Sarasvati you protect us. You who are joined with Maruts, who are a great fighter conquer our enemies. Indra kills that famous and powerful of Shandikas who despised us.

iyam SushmebhirvisaravAyi rujatsAnu giriNAm tavishebhurnibhih pArAvatahnImavase suvrktibhih sarasvatImAr vivAsemadhItibhih (RV 6.61.2)

We serve the Sarasvati who with flames and tides destroyed the peaks of mountains (the fortified towns) like one who plucks lotuses, with good prayers and with good nets for food. [... by her force and her impetuous waves, has broken down the sides of the mountains like a digger of lotus fibres.]

ni tvA dadhe vara A prthivyA iLayAspade sudinatve ahmAm drshadvatyAm mAnusha ApayAyAm sarasvatyAm revadagne didIhi (RV 3.23.4)

Oh Agni, you were placed on the earth on an auspicious day on the best of the places on the earth. Blaze with wealth among the men (on the banks of) Drshadvati, Apaya and Sarasvati.

imam me gaDe yamune sarasvatI Satudri stomam sacatA parushNyA asivanyA marudvrdhe citastayArjIkIye SrNutdyA sushomayA (RV 10.75.5)

Oh Ganga, Yamuna, Sarasvati, Sutudri with Parshi, Marudvridha with Asikni; Arjikiya with Vitasta and Sushnoma hear this praise.

ambitama ... naditama (RV. 2.41.16)

best of mothers ... best of rivers ... Ascertaining the wishes of the great sages the best of rivers (the Sarasvati) incorporated AruNA with her own body; formerly the flow (of the AruNA) was hidden. Afterwards (the Sarasvati) inundated the divine AruNA with its own waters.

A yat sAkam yaSay vAvaSnAh sarasvati saptathI sindhumAtA yAh sushvayanta sudughah sudhArA abhisvena payasa pIpyanah (RV 7.36.6)

May the seventh (stream), Sarasvati, the mother of the Sindhu and those rivers that flow copious and fertilizing, bestowing abundance of food, and nourishing (the

people) by their waters, come at once together.

prakshodasA dhAyasA sasr eshA sarasvatI dharUNa-
mAyasI pUh prabAbadhana ratthyeva yAti vishvA apo
mahina sindhuranyA (RV 7.95.1)

This Sarasvati, firm as a city made of Ayas (copper) flows rapidly with all sustaining water, sweeping away in its might all other waters, as a charioteer (clears the road). Alternative: AyasIh pUh : (Sarasvati is) like a great fortified town. [With her fertilizing stream the Sarasvati comes forth. (She is to us) a stronghold, an iron gate. Moving along, as on a chariot, this river surpasses in greatness all other waters.]

ekAchetat sarasvatI nadInAm SuchIryati giribhya A
samudrAt rAyaSchetantI bhuanasya bhurer ghrtam payo
dudue nAhusHaya (RV 7.95.2)

Sarasvati, chief and purest of rivers, flowing from the mountains to the ocean, understood the request of Nahusha and distributing riches among the many existing things, milked for him butter and water. [Alone among all rivers Sarasvati listened, she who goes pure from the mountains as far as the sea. She who knows of the manifold wealth of the world has poured out to man her fat milk.]

[cf. Max Mueller, Sacred Books of the East, xxxii.60: "Here we see Samudra used clearly in the sense of sea, the Indian sea, and we have at the same time a new indication of the distance which separates the Vedic age from the late Sanskrit literature. Though it may not be possible to determine, by geological evidence, the time of the changes which modified the southern areas of the Punjab and caused the Sarasvati to disappear in the desert, still the fact remains that the loss of the Sarasvati is later than the Vedic age, and that, at that time, the waters of the Sarasvati reached the sea."]

cf. RV 10.64.9

4. THE 'CULT OBJECT' ON HARAPPAN SEALS

What was this 'cult object' which occurs on Harappan seals 'called' in the lingua franca of circa 2500-1700 BC? What does it connote?

Using the 'rebus' principle for decipherment of glyphs is a method that proved successful in deciphering Egyptian hieroglyphics. This principle has been modified and extended to cope with the Harappan glyphs (e.g. svastika) and other pictorial motifs (e.g. unicorn, 'cult object', animals occupying the 'field' of the seals with inscribed sign sequences).

WHAT DOES THE 'CULT OBJECT' LOOK LIKE?

It is a portable device that could be carried with hands aloft the shoulder of the carrier, as evidenced in Harappan tablets where this object occurs also as a field symbol by itself (without the ubiquitous 'unicorn'). The structure has two elements.

It depicts a 'flow' or a 'churning motion' on the upper element. The upper element ends in a tapering, sharp-pointed edge as it rests (or just floats) on the lower element.

The lower element is a bowl which also depicts some 'spilling' or 'drops' or alternatively, some 'smoke or dust' and 'dotted droplets'.

Mahadevan calls the structure a 'filter' and sees echoes of 'soma process.

I call it a 'drill-lathe-stove', the lapidary's tools of trade. The upper element looks like a drill used by the lapidary to drill holes in, say, faience beads. The lower element is the stove to bake the inscribed object.

The rationale for this interpretation is as follows: The upper element is the sharp-pointed drill bit depicted with zig-zag lines in a churning motion. The lower element is a portable stove depicted with flames or smoke emanating and bits of 'drilled' articles depicted with dotted circles around the bowl.

WHAT WAS THE 'CULT OBJECT' CALLED?

WHAT DOES THE HOMONYM 'MEAN' IN HARAPPAN ECONOMY?

There is a word in Gujarati (and cognate words of South Asian languages which can be semantically clustered) which connotes both a 'drill-lathe' and a 'portable stove'. The word is sangaDi.

Rebus: jangaDi is an extraordinarily specific, technical-professional term in Gujarati. It connotes an armored guard who accompanies the treasure brought into or taken out of the treasury. A cognate Sanskritized morpheme is jagada = a guard. cf. also jagati = pedestal.

5. FREQUENTLY ASKED QUESTIONS AND SOME ANSWERS

What is the sarasvati river civilization?

After the discovery of the first archaeological site at Harappa in 1920, the civilization was referred to as Harappan culture. With the discovery of another major site at Mohenjo-daro in the same decade, it was rechristened as Indus civilization. Since 1950's a number of new type sites have been located. In particular, the sites of Rupar, Kalibangan, Lothal, Dholavira and Banawali. The characteristic feature of the location of these sites is that these are on the banks of or very close to the 'lost' sarasvati river. Hence, the civilization should be re-christened as IndusSarasvati civilization. Sarasvati river is extolled in the Rigvedas(Rks).

Does the river exist in part and rest of it has disappeared?

A part of the river exists as Ghaggar in Haryana; the rest of it has disappeared in the fringes of the marshland or the thar desert.

Where were the geological excavations done?

Landsat pictures have revealed the traces of the lost river right upto Hakra river and the Rann of Kutch. Geological surveys in a number of locations along the 'lost' river course have established the existence of a river flowing down from the Siwalik ranges and also the changes in the courses of the Indus tributaries and the Yamuna rivers. As Yamuna and Sutlej captured the water sources, Sarasvati might have dried up, aided by the upraisings of land caused by earthquakes.

What was found in the process?

The cumulative knowledge gained through geology, landsat and archaeological finds establishes the vast expanse of this great civilization. Kalibangan and Lothal may not be as grandiose as the urban Harappa but are typical IndusSarasvati civilization sites.

How does it relate to Harappan civilization?

Seals of the type found in Harappa and Mohenjo-daro are also found in the Sarasvati river sites. Kalibangan also shows a ploughed field and fire-altars.

What 'message' would you like to carry to persons of the group?

More researches need to be done in identifying the civilization that flourished along the sarasvati river. Balarama's sojourn along this river up from the Rann of Kutch is depicted in the Mahabharata. This has to be studied further. Sanskrit literature will have abundant material on the importance of sarasvati. Siddha-mAtrka is the name of the BrAhmi script. BrAhmi is another name for Sarasvati. Without apriori assumption that brAhmI was derived from the IndusSarasvati seal inscription script, it should be possible to postulate a hypothesis that sarasvati river played a significant part in the sustenance of the civilization circa 2500 to 1700 B.C. This may mean a new paradigm in our protohistoric studies. Aryans and Dravidians and perhaps Mundas lived in harmony in this civilization. The so-called indo-aryan and so-called dravidian languages may have originated from the common lingua franca spoken by these people on the Indus and Sarasvati river valleys. Thus, common words of Tamil can be found in Sanskrit/Vedic. I have established that the Dravidian etymological dictionary with 5000 entries can cease to exist since many of these words have cognates in vedic/munda and many south asian languages.

What research is going on to find the remains of the civilization?

Hopefully, this perspective should lead to more intensive geological and archaeological work on the banks of the lost river which has hundreds of unexplored sites.

What kind of critical comments are you expecting from 'general public'?

There should be an awareness that there is an essential unity that binds the south asian culture. Scholars

should help build up on these strands of unity.

What would people do to help you out in your research or book, if such is in the process?

People should provide with info on cultural habits of the peoples of the region traversed by the rivers. For e.g. the festival bhogi celebrated on winter solstice is not only a South Indian festival. Bhogali bihu is celebrated in Assam; Rohri in Punjab. What is the ancient significance of this day? What are the practices followed by the womenfolk and agriculturists? Is something done about land rights on this day or is it just restricted to the distribution of winter crop produce?

Why is Sarasvati revered as goddess of speech?

What are the anecdotes linked to Brahma?

Why are so many brahma temples found along this river?

What kind of research is already done?

A number of claims of decipherment of IndusSarasvati script have been made. Mahadevan counted upto 40 such claims in 1992. Each new claim renders every one of the 40+ claims suspect. The problem is acute because we do not have a 'rosetta stone' or multilingual inscriptions to authenticate the correctness of a decipherment. The next problem is the sample is rather small - only 2500+ inscriptions have been reported. The next larger problem is the so-called cleavage between the so-called Indo-Aryan and so-called Dravidian languages which has led to two distinct language groups in decipherment claims. [Is this cleavage valid in 'semantic' terms? Any Prakrit dictionary will attest to thousands of words common to both language streams?]

Which are the supporting organizations?

Univ. of Pennsylvania, Philadelphia has a group working on this problem. Prof. Asko Parpola in Helsinki Univ. is a keen enthusiast. Mahadevan in Madras has dedicated his entire life to this problem. Univ. of Aachen has a team working on the architectural aspects of Mohenjodaro.

What kind of research can foreign organizations support?

Areas which can be supported are: research into languages of south asia and comparative lexemes and grammatical features; archaeological explorations, more landsat analyses and geological drillings of more sites along the sarasvati river.

How will your earlier message about 'cult' item fit in this series?

The earlier message is intended to re-kindle an interest among a large group of scholars to indicate if there are words in the south asian languages which may fit

with the pictorial motif. From an artistic point of view, is the interpretation valid? Are there alternative readings? What indeed were the IndusSarasvati people trying to convey through such seal messages?

Are there words similar to Gujrati sangADi in other South asian languages and what do the words mean?

Dr. S. Kalyanaraman

The End