Chapter 4: Our Approach

In this chapter, we examine possible astronomical intent in the form and layout of the megalithic monuments of peninsular India. We put special emphasis on insights that must have gone into the design and layout of megaliths, as well as into their relationship with their surroundings. We discuss this in the context of the sites visited by us and a study of the material culture of the cultures that built these monuments, including the monuments themselves, since the only graphic clues that these pre-literate societies left behind may be among the scattered panels of rock-art at or near many megalithic sites.

4.1 Background – megalithic knowledge systems and belief systems: In a larger perspective, understanding the astronomical knowledge of the megalith builders as codified in the monuments themselves is a part of a vaster scheme to understand the knowledge systems possessed by the megalith-building cultures. It is evident that these cultures possessed a good working knowledge of geometry, geology and engineering, judging from the procurement of large stone slabs of various materials depending on the region, their transportation and working into components of the required size and shape, and their final erection in desired patterns. It is also evident that these structures played a very important role in the lives of the people who built them – the sheer amount of energy and time expended by these early cultures on the construction of megaliths bears testimony to this. But what exactly these monuments meant to the megalith-building society is lost to us today. We know that a large fraction of megaliths were burials, usually secondary burials of more than one individual. However, what governed the design of the structure to house these burials? Was there belief in after-life? Clues from rock-art, such as at Onake Kindi (see Figs.1.11, 3.14), suggest that the megalithic artist is depicting that the form of the megalithic burial (boulder-circle, in this case) goes beyond functional meaning, though the exact meaning of the wave-like pattern in one half of the burial, the ladder-like structure dividing this from the other half depicting the actual burial and the serpent-like forms around the boulders of the circle as well as the petal-and-ray pattern surrounding the composition, can only be guessed at. The location of this depiction of a megalith – on a horizontal overhang from the vertical panel where everyday scenes of cattle and people are drawn, is also probably of symbolic significance.
Comprehension of some of these issues helps us to better grasp the mind of our megalith-building ancestors. Did their minds rise above the mundane, repetitive activities of daily life for survival to grapple with the larger questions of the nature of the universe around them?

Conventional archaeology provides us a rich understanding of bygone societies with an understanding of their material culture – which includes artefacts such as pottery, weapons and implements, beads and other adornments etc. as well as remnants of organic material such as food grains, bones of animals and birds used for food, interred bones and other such material. While this “material text” enables us to understand quite a bit about the state of technology that existed at a given period, not much headway can be made in the understanding the status of knowledge, and hence, the intellectual level possessed by a given culture. Modern archaeological methods today have moved away from the traditional concept of an archaeological “site”; for instance, an area containing conspicuous megaliths can easily be called a “site” but the human activity that gave rise to those monuments was played out on a landscape much larger than the site defined by the monuments themselves. Today, Landscape archaeology examines human activity on a larger scale – on the entire physical landscape of consequence. Also, experimental archaeology and the modelling of growth and spread of cultures using computational models etc. are expanding the traditional area of engagement of archaeological research. However, a study of the monuments themselves as they have been left behind, as expressions of a cultural group presents the only way we can hope to understand the collective mind of these cultures. Information on what kind of knowledge megalith-building societies possessed would be an important step in the understanding of the intellectual level possessed by their culture. This could play an important role in better comprehension and interpretation of the other facets that are known about their culture, for instance, their burial practices and associated as well as other belief systems.

Developing an understanding of directional preferences in the orientation of structures could help in understanding of preferential orientation of later architecture in the subcontinent – both religious and secular. Similarly, studies of the astronomical knowledge of early inhabitants of the subcontinent could provide clues to the origin of the rich wealth of astronomical knowledge, symbolism and lore that arose later in the region.
4.2 Aims and objectives of the current study: This study investigates the megalithic structures of peninsular India for possible astronomical intent in their design and layout. By “astronomical intent” I mean deliberate alignment of a structure or its components to points of astronomical significance on the horizon or otherwise. This could be as simple a matter as the deliberate alignment of a burial structure to face sunrise or sunset or even a structure designed to keep track of the heavenly cycles. The aim is to determine whether any aspect of the heavens influenced the design or layout of any of the megalithic typologies.

A fair understanding exists of these monuments from the archaeological perspective from the excavations and other archaeological exploration of Indian megaliths in the nearly 200 years since the first report of an Indian megalith in 1823 by Babington. There exist large gaps, however, in our understanding of these structures – viz. their chronology and their relationship to the habitation sites of their builders. The biggest contribution of archaeological investigations has been the identification of a group of monuments diverse in form, material and expression as different facets of the same material culture. It is now required to concentrate on the differences – what are these monuments? What were the non-sepulchral megalithic monuments used for?

The current classification of megaliths into sepulchral and non-sepulchral does not help in specifying what the latter were used for. It is highly likely that this category lumps together a large number of monuments of diverse purposes. As discussed earlier, dolmens were most probably memorial in nature considering their similarity in structure to cist burials and dolmenoid cists which are funerary in purpose. However, not much is known about the purposes for which many other non-sepulchral megaliths were erected. Menhirs have been found in sepulchral contexts at many sites in Kerala, but many menhirs – like the ones excavated by Thapar (1957) at Maski have been found to be non-sepulchral. Thus it is obvious that, at least in the case of megaliths like menhirs, their possible use has to be understood in the context of their setting, since it is likely that menhirs may have served various purposes depending upon where they were erected. Even more mysterious are the stone alignments or avenues, the exact meaning of these monuments still elude scholarly research.

It is possible that several or at least some of these monument types have astronomical purposes? It is almost impossible to infer these, if any, from published reports and descriptions of megalithic sites and monuments since it is essential to understand the relation of the monument
with respect to the site to test a given monument for possible astronomical alignments. For instance, a possible sightline to the rising or setting point of a celestial object may be inferred from a well-drafted and oriented plan of the monument, but this might well be negated if one considers topographic data of the surroundings. Hence it is usually necessary to undertake a fresh survey of a site from the perspective of archaeoastronomical investigations.

Thus, in a sense, we are attempting to understand the relationship between an object (a megalith) and a place (its physical context in the site) and trying to figure out if the builders were attempting to relate it to the cosmos by incorporating any deliberate orientations of the monument as a whole or any of its components. This “contextualisation of archaeological features within the broader canvas of their site and surroundings” to explore if there were any celestial basis to their setting out is what forms the backbone of this study. For instance, was there astronomical intent in the setting out of monuments or did celestial considerations and not just those of livelihood even influence factors like site selection?

In essence, this study is about trying to comprehend a small but important facet of the cultural phenomenon of megalithism on a larger (geographical) canvas from published literature, interaction with other research workers and mainly through independent fieldwork.

4.3 Summary of aims and objectives:

4.3.1 Aim: To investigate a selected sample of the megalithic monuments of peninsular India for possible astronomical intent in their form design or layout with a view to understanding megalithic knowledge systems. Astronomical intent may include deliberate alignment of a monument or any of its components to directions of astronomical significance.

4.3.2 Objectives:

- To understand the typology and distribution of the various megalith typologies existing in the subcontinent and shortlist a sample for studying the aim stated above, representing each megalith type.
- To study the design and layout of the various structures at the shortlisted site.
- To investigate the monuments at the shortlisted sites for possible astronomical sightlines.
- To test, both statistically and by other means, whether there is a realistic chance that these alignments, if any, could have arisen purely by chance.
- To determine whether conclusions about any aspects of the astronomical knowledge of the megalith-builders can be drawn from the study of these monuments alone.

In addition, it is expected that insights about structural and construction techniques, stoneworking skills, stylistic evolution etc. of megalith types might emerge from the study of monuments of similar type in different sites.

### 4.4 Methodology:
The methodology adopted for this study is summed up in Fig.4.1.

![Diagram](image-url)

**Figure 4.1: Methodology adopted for this study**
The first stage in the study was a thorough search of all relevant literature, including archaeology and megaliths, ancient architecture, Indology, positional astronomy, archaeoastronomy etc. This was also bolstered by discussions with experienced research workers in megalithic studies. From the discussions and studies of relevant literature, a shortlist of sites to be visited was drawn up. Care was taken to cover all the major typologies of megalithic monuments in various regions, though the area of study was limited to north and south Karnataka and Kerala – a size that permitted reconnaissance visits to many sites followed by rigorous fieldwork at selected sites, all within a reasonable amount of time. A site at Burzahoma, Kashmir and three sites in the Vidarbha region near Nagpur were selected as comparison sites at sufficient geographically removed locations. A total of 31 sites including the comparison sites at Kashmir and Vidarbha as well as the sites in Karnataka and Kerala were visited for reconnaissance (See Table 4.1). One additional megalithic site at Vadakkipatti in Tamilnadu was visited to study stylistic variations. One site visited (Konan Kallu, Karnataka) turned out to be non-megalithic and is not listed below. Three other sites visited (Santhekatte, Hoynali and Kabbina Kallu, all in Karnataka) had only single standing stones that could be megalithic menhirs, but are not listed below. Out of the visited sites, two sites (at Kyaddigere near Aihole and Gudde Maradi near Shimoga) were found to have been completely devoid of monuments, the megaliths reported in earlier studies having been completely destroyed in development activities. Two hitherto unreported megalithic sites – Chikel Chetti near Bandipur and Aaraga Gate near Tirthahalli were discovered in the course of fieldwork for this study (Menon, Vahia and Rao, 2011). Of all the sites visited, Nilaskal, Byse, Vibhutihalli, Bandipur, Hire Benkal and Onake Kindi were visited again several times for surveys. Studies of design and layout and surveys for orientation data were carried out at several other sites, as listed in Table 4.1.

**Table 4.1:** List of the megalithic sites visited (not including 5 sites mentioned above)

<table>
<thead>
<tr>
<th>No.</th>
<th>Site (in order of visit)</th>
<th>Type of megalithic site</th>
<th>Condition</th>
<th>Nature of visit (s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Brahmagiri, Karnataka</td>
<td>Chamber/pit burials</td>
<td>Severely disturbed</td>
<td>Reconnaissance</td>
</tr>
<tr>
<td></td>
<td>Site</td>
<td>Feature Details</td>
<td>Condition</td>
<td>Survey Method</td>
</tr>
<tr>
<td>---</td>
<td>-------------------------------</td>
<td>------------------------------------------</td>
<td>-----------</td>
<td>------------------------</td>
</tr>
<tr>
<td>2</td>
<td>Marayoor, Kerala</td>
<td>Dolmens, rock art</td>
<td>Disturbed</td>
<td>Reconnaissance</td>
</tr>
<tr>
<td>3</td>
<td>Burzahoma, Kashmir</td>
<td>Neolithic, megalithic, pit burials, menhirs</td>
<td></td>
<td>Reconnaissance/comparison</td>
</tr>
<tr>
<td>4</td>
<td>*Chikel Chetti, Karnataka</td>
<td>Cairns, chamber burials</td>
<td>Disturbed</td>
<td>New discovery, surveyed</td>
</tr>
<tr>
<td>5</td>
<td>*Hire Benkal, Karnataka</td>
<td>Chamber burials, dolmens</td>
<td>Mostly intact</td>
<td>Orientation surveys</td>
</tr>
<tr>
<td>6</td>
<td>*Onake Kindi, Karnataka</td>
<td>Rock art</td>
<td>Mostly intact</td>
<td>Rock art documentation</td>
</tr>
<tr>
<td>7</td>
<td>*Nilaskal, Karnataka</td>
<td>Avenue</td>
<td>Mostly intact</td>
<td>Surveyed</td>
</tr>
<tr>
<td>8</td>
<td>*Byse, Karnataka</td>
<td>Avenue, cairns</td>
<td>Mostly intact</td>
<td>Surveyed</td>
</tr>
<tr>
<td>9</td>
<td>Heragal, Karnataka</td>
<td>Avenue?</td>
<td>Mostly intact</td>
<td>Reconnaissance</td>
</tr>
<tr>
<td>10</td>
<td>Mumbaru, Karnataka</td>
<td>Avenue?</td>
<td>Disturbed</td>
<td>Reconnaissance</td>
</tr>
<tr>
<td>11</td>
<td>Eyyal, Kerala</td>
<td>Rock-cut burial</td>
<td>Mostly intact</td>
<td>Orientation survey</td>
</tr>
<tr>
<td>12</td>
<td>Kudakallu Parambu, Kerala</td>
<td>Kudakkals, topikals, multiple hood-stones, menhir</td>
<td>Mostly intact</td>
<td>Orientation surveys</td>
</tr>
<tr>
<td>13</td>
<td>Chowwannur, Kerala</td>
<td>Rock-cut burial</td>
<td>Mostly intact</td>
<td>Orientation survey</td>
</tr>
<tr>
<td>14</td>
<td>Kakkad, Kerala</td>
<td>Rock-cut burial</td>
<td>Mostly intact</td>
<td>Orientation survey</td>
</tr>
<tr>
<td>15</td>
<td>Kattanakampal, Kerala</td>
<td>Rock-cut burial</td>
<td>Mostly intact</td>
<td>Orientation survey</td>
</tr>
<tr>
<td>16</td>
<td>Ariyannoor, Kerala</td>
<td>Kudakkals</td>
<td>Disturbed</td>
<td>Orientation surveys</td>
</tr>
<tr>
<td>17</td>
<td>Kandanasserry, Kerala</td>
<td>Rock-cut burial</td>
<td>Mostly intact</td>
<td>Orientation survey</td>
</tr>
<tr>
<td>18</td>
<td>Aihole, Karnataka</td>
<td>Chamber burials, dolmens</td>
<td>Mostly intact</td>
<td>Orientation surveys</td>
</tr>
<tr>
<td>19</td>
<td>Bachinagudda, Karnataka</td>
<td>Chamber burials</td>
<td>Mostly intact</td>
<td>Orientation surveys</td>
</tr>
<tr>
<td>20</td>
<td>Hanamsagar,</td>
<td>Avenue</td>
<td>Slight</td>
<td>Partial survey</td>
</tr>
<tr>
<td>Karnataka</td>
<td>disturbance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------------</td>
<td>------------------------------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kyaddigere, Karnataka</td>
<td>Chamber burials Destroyed Reconnaissance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chik Benakal, Karnataka</td>
<td>Chamber burials Disturbed Orientation surveys</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vibhuthi halli, Karnataka</td>
<td>Avenue Mostly intact Surveyed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bheemarayanagudi, Karnataka</td>
<td>Avenue? Severely disturbed Partial survey</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gudde Maradi, Karnataka</td>
<td>Menhirs Destroyed Reconnaissance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Konaje Kallu, Karnataka</td>
<td>Dolmens Disturbed, 2 mostly intact Reconnaissance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kakkunje, Karnataka</td>
<td>Dolmens Disturbed, 2 mostly intact Reconnaissance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rajan Koluru, Karnataka</td>
<td>Dolmens Disturbed, some mostly intact Orientation surveys</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aaraga Gate, Karnataka</td>
<td>Avenue? Disturbed New discovery, partially surveyed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vadakkipatti, TN</td>
<td>Boulder-circle Mostly intact Comparison</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Junapani, Maharashtra</td>
<td>Cairns, boulder circles, pit burials Mostly intact Reconnaissance, comparison</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nagbhid, Maharashtra</td>
<td>Avenue? Disturbed Reconnaissance, comparison, partial survey</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Champa, Maharashtra</td>
<td>Boulder circles Mostly intact Reconnaissance</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note:  - * indicates sites visited more than once

- Sites numbered 11-17 are all in Thrissur district of Kerala and are within a few kilometres of each other. They are listed separately because they are distinct enough not to be
lumped together as one site. Similarly, Aihole (18) and Bachinagudda (21) are close by to each other and Bheemarayanagudi (24) is close to Vibhutihalli (23), but are distinct enough to merit being listed as different sites.

4.4.1 Astronomy in megaliths: It was recognized that there may be two ways of approaching the identification of astronomical knowledge as codified in the form and design of megalithic monuments:

i. Identification of structures that possibly incorporate the knowledge of astronomy among its builders in its conception and design: A simple alignment to the cardinal points could fall into this category – it indicates that the builders knew enough astronomy to determine the cardinal directions. The very existence of a large number of structures aligned to the cardinal points implies a degree of planning, observation and measurement (Norris and Hamacher 2011). Thus the orientation studies of dolmens, chamber burials, avenues etc. were analysed to determine this, provided that there were enough monuments at a given site to statistically analyse this. Furthermore, orientations of tombs, memorials and other monuments were analysed to see whether they fell within the swathe of sunrise/sunset for the extant latitude. Thus, it could be determined whether they were intended to face the rising or setting sun on any day of the year.

ii. Identification of structures that were possibly used to acquire and further astronomical knowledge: These could be structures that were meant to observe celestial objects and infer information about cosmic cycles. This could be something as simple as a gnomon or an arrangement of stones/menhirs to form a calendar device. Several avenue sites were potential candidates for this category. The sites at Vibhutihalli, Hanamsagar, Nilaskal and Byse were selected as candidate sites with high potential. However, Hanamsagar could not be surveyed due to its relatively remote location and the magnitude of the monument making it difficult to survey in the given constraints of time and resources.

Of course, it is possible that structures such as described in (ii) might not exist; it could well be that observations may have been made with wooden posts or maybe smaller instruments, but we are testing the possibility that stone monuments were also constructed and used for calendrical
time-keeping. Also, we have to be open to the possibility that (i) and (ii) do not represent classes with mutual exclusivity – there might be combinations of the two also. Therefore investigations of all classes of megalithic structures have to be approached with these possibilities in mind.

4.4.2 Astronomical sightlines at avenue sites: After analysis of orientation and other data from all surveyed sites, sites at Nilaskal, Byse, Hanamsagar and Vibhutihalli were selected for detailed investigation for alignment studies. However, the site at Hanamsagar could not be surveyed due to the large area covered and the relative remoteness of the site. During one of the follow-up site visits, it was observed that several pairs of menhirs were framing the setting sun on the local horizon during winter solstice at Nilaskal. Detailed surveys of Nilaskal and also Byse, which seemed to have similar characteristics, were undertaken. At Nilaskal, where the land slopes gently up towards the west, topographic survey was also undertaken. The orientation of each standing menhir at both sites were measured and it was seen that the individual menhirs at both sites are oriented mostly north-south. The sightlines between menhirs at each site were studied and it was found that there are large numbers of sightlines between menhirs that are aligned to the rising and setting sun during both summer and winter solstices. Byse appears to have intentional sightlines to the rising and setting moon during major and minor standstill lunistices too, though this could not be proved definitively. The observed sightlines were tested statistically and using other features as indicators. The observed sightlines were also tested for viability using topographic analysis as well as verification at site – they were tested for visibility of backsight from foresight as well as for view of observed phenomenon on horizon from inferred station points. Vibhutihalli was also surveyed as a case example of a known avenue site for comparison with Nilaskal and Byse.

4.4.3 Preferred orientation patterns at sepulchral sites: Orientation data was obtained at several sepulchral sites, for all monuments at those sites. The preferred patterns of orientational preferences were obtained from this data for monuments at Aihole, Bachinagudda, Bandipur, a sample of the large number of monuments at Hire Benakal, Chik Benakal, Konaje Kallu, Kakkunje and Rajan Koluru in Karnataka as well as the sites at Thrissur, Kerala. For the Kudakkals at two sites at Thrissur too orientation data were taken for the lines of joinery as will be explained in the next section on study areas and methods.
4.4.4 Stylistic evaluation and possible chronology as deduced from the refinement of working, components, form and design: This investigation involved the study of different types of megalithic monuments at various sites. Chamber burials/dolmens were studied at Brahmagiri, Chikel Chetti, Hire Benkal, Aihole, Bachinagudda, Chik Benakal, Konaje Kallu, Kakkunje and Rajan Koluru in Karnataka and at Marayoor in Kerala. Rock-cut burials were studied at five sites in Thrissur, Kerala, too. Avenue sites were studied at Vibhutihalli, Bheemarayanagudi, Hanamsagar, Nilaskal, Byse, Hergal, Mumbaru and Aaraga Gate. Using innovations and improvements in design for structural stability, improvements or refinement in stone-working skills and development of embellishments, an attempt at relative dating by stylistic evaluation was made. This, however, can be verified only after a proper chronological framework for megaliths is evolved with suitable dating techniques in the future.

At large, complex and most probably composite sites like Hire Benakal, which were most likely in use for several generations, it is possible to see several classes of monuments which reflect differing approaches to design and construction. Not too many megalithic sites on the subcontinent have this richness and diversity and for that reason alone, Hire Benakal is a very important site in the study of Indian megaliths.

From all the above studies and analyses, conclusions were drawn about the design and layout of megalithic monuments and the astronomical knowledge codified in these. These results and discussions are presented in Chapter 6.

4.5 Study areas: After a survey of the available literature on megaliths and discussions with experts who have worked in this field, it was decided to make a shortlist of monuments to be studied. The shortlist had to reflect the representation of all the broad typologies of megaliths – both sepulchral as well as non-sepulchral. Taking into consideration practical aspects such as travel time to sites and time to be spent on measurements, survey etc. it was decided to confine the list to a small region that reflected all the existing diverse forms of megaliths. It was also decided to take up a smaller number of sites in vastly different geographical regions as comparison sites.
The sites to be studied were mostly in Karnataka and Kerala. One comparison site was studied in Tamilnadu, three in Vidarbha region, Maharashtra and one in Kashmir Valley, Jammu and Kashmir.

Broadly, the areas studied in Karnataka can be divided into two regions – north Karnataka and south coastal Karnataka. In north Karnataka, the sites studied were Brahmagiri, Hire Benakal, Onake Kindi, Aihole, Bachinagudda, Hanamsagar, Kyaddigeri, Chik Benakal, Vibhutihalli, Bheemarayanagudi and Rajan Koluru. In south coastal Karnataka, the sites studied were Nilaskal, Byse, Hergal, Mumbaru, Gudde Maradi, Konaje Kallu, Kakkunje and Aaraga Gate. One more site in Karnataka – Chikel Chetti was studied near the Bandipur Wildlife Sanctuary close to the border with Kerala and Tamilnadu. The sites studied in Kerala were the Thrissur group of sites and one at Marayoor, near the well-known hill station of Munnar. The site studied in Tamilnadu is a boulder circle site at Vadakkippatti in Thanjavur district. The sites studied in the Vidarbha region are all near Nagpur – Junapani and Champa being boulder circle and cairn circle sites and Nagbhid being a menhirs site, probably an avenue too.

4.5.1 The sites of north Karnataka: The sites of north Karnataka are located in a region rich in terms of topography and climate (Sundara 1975, p. 10). There are chains of hills of various rock types and hills and valleys of each type of rock have widely differing character. Areas in different parts of this region – which extends from 14° 20’ to 17° 30’N in latitude and 74° 30’ to 77° 30’E in longitude, are endowed with varying amounts of rainfall annually, thus creating even more diversity in character. Part of this region and some of its surrounding regions – viz. districts of Raichur, Bellary and Chitradurga as well as Anantapur and Kurnool in Andhra Pradesh formed one of the largest nuclei of megalithic culture in the Deccan.

a. Brahmagiri: Brahmagiri is the celebrated site excavated by Wheeler (1948) wherein he laid the foundations of stratigraphy in the study of prehistoric and protohistoric south India and established the chronology, ceramic typology and even the basic historical understandings of South Indian prehistory (Morrison 2005). It is a granitic outcrop rising about 600 feet above the plain, within Molakalmuru Taluk of the Chitradurga District of Karnataka State. The megalithic site is located close to Asoka Siddapura – the site of two minor rock edicts of Emperor Asoka, known as Isila during Asoka’s reign. Wheeler’s excavations of 1947 established a sequence of three cultures at the habitation site near the megaliths – a Neolithic-Chalcolithic Period I,
followed by the megalithic Period II and a Period III Early Historical culture which he called the Andhra culture, the last of which was datable due to the recovery of evidence of Roman contacts from this level (Rao 1972).

The burials during the Neolithic were within the habitation area – infants were interred in urns and adults were buried in pits in extended position. During the megalithic period, cist and pit burials with surface markers of boulder circles emerged. It was Krishna who first observed these hundreds of cist circles, many of them cist graves made of thin slabs with or without capstones and boulder circles around them (Rao 1972, p. 153). Wheeler excavated ten megaliths – both pit (4 nos.) and cist circles (6 nos.) in 1947. Recently, the re-analysis of samples of wood collected by Wheeler by Morrison (2005) gave an overall range of between 2140-1940AD, which suggests that the practice of erecting megaliths may have begun during the South Indian Neolithic itself.

Brahmagiri was visited because it is one of the defining sites in the study of megaliths in peninsular India. It is also labelled as a type-site in the sense that the term “Brahmagiri style cists” with port-holes has become a standard for comparison of construction techniques and form. Our visit to Brahmagiri revealed severely disturbed megaliths in the areas studied by Wheeler, with stones of the boulder circles badly disturbed, capstones missing and orthostats

Figure 4.2: Map showing location of Brahmagiri (Wheeler 1948)
broken and disturbed in many cases, though a few unexcavated megaliths also appeared relatively intact. The on-site observations are discussed in the next chapter.

b. Hire Benakal: Hire Benakal (15° 25’ 33″N, 76° 27’ 24″E) is probably the most important site in the study of megalithic cultures in south India. The site which is set in the midst of low rocky hills of granite-gneiss, is one of the largest megalithic sites in India both in terms of extent and number of structures, was first noticed by Keis as described in Meadows-Taylor (1941). The site can be approached from the old Hire Benakal town, which is accessed from the highway connecting Gangawati to Koppala and is about 55km from Hospet – the nearest large town. The hill where the megaliths are located is known as “Moriyarare Gudda” (Hill of the Dwarves) locally and has to be approached on foot. It is believed that a dwarf race endowed with superhuman strength erected the structures – especially the port-holed dolmens and dolmenoid cists as their residences.

Figure 4.3: Showing a satellite picture of the location of the megalithic site of Hire Benakal and the rock art site of Chitra Gund

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The megaliths, which consist of a rich repertoire of forms varying from the very simple to highly complex (described in detail in the next chapter), are scattered in three distinct groups, separated by rocky outcrops, on the saddle of a hill. A habitation site was observed by Sundara (1975) less than a km from the cemetery. Surveying the entire group was an exercise beyond the scope of this study aimed at several sites, so the survey was confined to marking the extent of the groups and studying a representative sample of all the typologies.

Hire Benakal seems to be the largest among at least ten other smaller groups of megalithic structures at distances varying from 3 to 35km from it, including Chik Benakal discussed below. There are also at least two rock art sites nearby. Chitra Gund (15° 25’ 20”N, 76° 27’ 10”, see Fig. 4.3) is on the same hill as the megaliths, whereas Onake Kindi is a few km away to the south-east, closer to Anegondi across the Tungabhadra from the World Heritage Site of Hampi – the capital of the erstwhile Vijayanagara Empire.

c. Onake Kindi: Onake Kindi (15° 22’ 09”N, 76° 28’ 32”E, see Fig.4.5) is 40km by road from Hire Benakal, and is believed to have been used by the same culture that produced the megalithic monuments at Hire Benakal. The site is approached from the road connecting Anegondi from Hospet. The entry leads through a narrow gap between boulder strewn hills to an amphitheatre of low rocky outcrops, among which at five places within the amphitheatre and two places outside, paintings in red ochre and white pigments can be seen. The enigmatic representation of a megalith described in Chapter 3 (Fig. 3.14) is at Onake Kindi. The paintings will be described in detail in the next chapter.

d. Chik Benakal: The megalithic site of Chik Benakal (15° 24’ 25”N, 76° 25’ 48”E) is situated about 5km east of Hire Benakal and is across a major ridge in the range of hills and is approached from the village of Chik Benakal via another ancient site called Maleyammana Ooti, which seems to be an ancient ritual site associated with a small rivulet. Our visit turned up 15 port-holed dolmenoid cists of the Hire Benakal Eastern group type with almost all of them showing signs of vandalism and heavily disturbed.

e. Aihole: The megalithic site at Meguti Hill (16° 00’49”N, 75° 53’ 12”E) near Aihole is situated on the flat sandstone hilltop between the well-known Meguti Jain Temple (642AD) and the rock-
cut Jain cave to the south (see Fig.4.4). The megaliths, which consist of port-holed dolmens and other types, will be discussed in the next chapter.

![Figure 4.4: Aihole and Kyaddigeri (Sundara 1975)](image)

**f. Kyaddigeri:** The megalithic site of Kyaddigeri, which was reported by Sundara (1975) as extension of the Meguti Hill site, on a hill across a valley to the east, is approached by a road which passes in front of the rock-cut Jain cave in the south. However, a visit to the site in January 2008 revealed that all the megaliths (some 60 in number, according to Sundara) had been recently destroyed.

**g. Bachinagudda:** There are only two megaliths at this site (15° 56’ 53”N, 75° 47’ 57”E), which is near the well-known temple site of Pattadakal, near a hill. The site is approached from the Badami-Pattadakal road and is about 1.5km south of it. The two megaliths were mostly intact.

**h. Hanamsagar:** Hanamsagar (16° 19’ 31”N, 76° 27’ 05”E, see Fig.4.5), is the largest avenue site in Karnataka. It is east of the well-known town of Badami and north of Hire Benakal. This site, known locally as *Salgal Bayalu* is described by Paddayya (1995) as discovered by the geologist G. Mahadevan in the Shorapur Doab formed by the confluence of the rivers Krishna and Bheema. It is situated among the Kodekal group of granite hills and is surrounded by signs of ancient inhabitations like a Mesolithic site, a Neolithic ashmound, megalithic sites like Rajan Koluru, Hegratgi etc. The monument, which consists of more than 2500 granitic stones arranged
in a specific pattern, is surrounded by a low circle of hills on all sides except the south. Allchin (1956) states that the stones are arranged in a diagonal grid.

Figure 4.5: Showing location of Hanamsagar with respect to Hire Benakal and Onake Kindi

**i. Rajan Koluru:** The nearby megalithic site of Rajan Koluru (16° 22’ 34”N, 76° 27’ 05”E), is situated about 5km north-east of the town of Kodekal and is approached from the Hunasgi-Kodekal road. Sundara (1975) reports nearly 90 limestone megaliths at the site in one group, but our visit in December 2009 showed only 47 megaliths distributed in two non-uniform groups and the remains of some others, the rest being lost to agricultural activities.

**j. Vibhutihalli:** The well-preserved stone alignment of Vibhutihalli (16° 39’ 53”N, 76° 51’ 31”E) is about 4kn south of the town of Shahpur on the left (eastern) side of the Shahpur-Surpur road. The alignment, which consists of nearly 1000 stones arranged in a diagonal-grid pattern, is on relatively flat ground roughly a square of 200m sides. The forest department, which has a plantation there, has protected the site very well.
Figure 4.6: Showing location of Vibhutihalli

Figure 4.7: Showing the location of menhir site at Bheemarayanagudi
k. Bheemarayanagudi: This site (16° 43’ 20”N, 76° 47’ 59”E), heavily disturbed now, which has a part of a stone alignment that was probably destroyed during road-building activities, is about 5km west of Shahpur (Fig. 4.7). It consists of 6-7 large undressed boulders and one fallen dressed menhir of granite-gneiss, though Sundara (1975) observed about 16 menhirs, mostly dressed.

4.5.2 The sites of south coastal Karnataka: There are a series of menhir sites in southern coastal Karnataka that were first studied by Sundara (1969, 1975, 2004). Sundara (1975, p. 146) mentions the megaliths at Nilaskal and Gudde Maradi while discussing the occurrence of menhirs south of the Raichur Doab. He lists Brahmagiri and Sanganakallu as having a small number of menhirs and then Nilaskal and Gudde Maradi in Shimoga district of Karnataka. The other three sites of Byse, Hergal and Mumbaru are listed in Sundara (2004). The megalithic site at Aaraga Gate nearby appears to be another of this series of sites. The sites of Udupi district – Konaje Kallu and Kakkanje were also studied.

a. Nilaskal: Nilaskal (13° 46’ 36”, 75° 01’ 09”) lit. “standing stones” in Kannada, is a village in Karimane Taluka located 24km by road south-west of the town of Hosanagara (Fig.4.8). The megalithic site is 8km away from the old town of Nagara, 1km off to the west from the road from Nagara to Udupi. Sundara (1975) noticed about 20 menhirs at the site, presuming many as missing, and also collected some sherds of Neolithic greyish ware pottery of the Maski fabric from a newly cut road trench that ran through the site. Nilaskal is the first Neolithic site to be noticed in the Sharavati river basin near the Western Ghats. Sundara (1975) also mentions that the menhirs of Nilaskal are “erected haphazardly unlike those of Vibhutihalli or North Karnataka.” Our visits have confirmed the presence of at least 100 menhirs at the site, including the broken stumps and remnants of several menhirs. Several others seemed to have been destroyed in the course of construction of a school and private residences in parts of the site.

b. Byse: The site (13° 49’ 45”N, 75° 00’ 43”E) in Byse village is located about 15km south of south-west of Hosanagara. It is off the new road from Nagara to the famous temple town of Kollur. Near the megalithic site, which is on an elevated open patch of land, is a large square plot of land surrounded by fortification walls in stone masonry that are more than 1.5m thick. This area, from which pottery, roof tiles etc. have been found, known locally as Bungle Gadde (lit. the field with the bungalow) is believed to have belonged to the Keladi Nayaka dynasty, which ruled
the region from 1499-1763AD. Sundara (2004) reports that he had heard of this site during his explorations at Nilaskal in the 1960’s and visited the site in the early 1990’s, when he found about a dozen menhirs, of which about six are almost intact, scattered over an area of 2-3 hectares. Two of the stones are under worship.

c. **Heragal:** The megalithic site at Heragal (13° 52’ 24”, 75° 06’ 3”) was also first reported by Sundara (2004) as discovered during his explorations in the region in 2002. Heragal is situated south-east of Hosanagara and is accessed from the town of Jayanagara, via Gorgodu village. Sundara (2004) reports about a dozen menhirs in various states of dilapidation scattered over an area of about 2 hectares. The tallest menhir at the site is worshiped by Saiva devotees.

d. **Mumbaru:** Mumbaru (13° 54’ 43”, 75° 07.47.3”) is a megalithic site, also reported by Sundara (2004), as discovered along with Heragal. Mumbaru (erroneously spelt as “Murumba” in Sundara 2004) is located almost east of Hosanagara and is accessed via a mud road that leads off the road connecting Heragal with Jayanagara at Kuntige. Sundara (2004) reports more than a
dozen menhirs in upright or slanting position. The largest menhir on the site has been enclosed in a shrine and is worshipped.

e. Gudde Maradi: The menhir site at Gudde Maradi (13° 54’ 01”N, 75° 34’ 25”E) was reported by Sundara (1975) as having five menhirs, one of them being 2.4m high, with a cross-section of 1.8m x 0.30m. The site was in a disturbed state even during his study and a visit in the course of the present study showed that all the menhirs had disappeared, presumably due to the activities of a granite crushing unit that is currently functioning at the site.

![Figure 4.9: Showing location of the megalithic site near Konaje Kallu](image)

f. Konaje Kallu: The site near Konaje Kallu (13° 05’ 07”N, 75° 03’ 30”E) in Udupi district is on a bare rocky hill near the town of Moodubidri, which is well-known for its Jaina monuments. Konaje Kallu is a rocky outcrop near Moodubidri, which has a religious math located up the hill. The megalithic site is located east of this distinct outcrop with twin summits (Fig. 4.9). Two port-holed dolmens are located on the site in good condition with several more in dilapidated state.

g. Kakkunje: This site in Kundapur taluka of Udupi district has two dolmens in partly dilapidated state and several more in severely dilapidated state. The site is accessed from Brahmanavar via Kakkunje village and Gavali (which has rock art depicting bulls possibly
belonging to the megalithic period) on the way to Kabbina Ithlu on a mud road. The site is thickly forested with evidence for the quarrying of slabs among rocky patches nearby.

**h. Aaraga Gate:** The megalithic site at Aaraga Gate (13° 44′ 12.9″ N, 75° 12′ 38.7″ E) was discovered in the course of this investigation (Menon, Vahia and Rao, 2011). The site has stumps of eight menhirs in a plantation by the eastern side of the road leading from Tirthahalli to Aaraga. This site seems to be very similar to the site at Heragal with respect to the type of menhirs.

4.5.3 The site at Chikel Chetti: The site at Chikel Chetti (11°39′45″N, 76°43′19″E) was also discovered in the course of this study (Menon, Vahia and Rao, 2011). Chikel Chetti may be reached by a mud road that diverts towards the left from the asphalt road that leads from Bandipur Wildlife Sanctuary in the Chamarajnagar District of Karnataka towards Mudumalai Wildlife Sanctuary in Tamilnadu. The area where the megaliths are situated is flat and plain, with scrub forest nearby. There are low hills visible on the horizon. The megaliths, which consist of 5 exposed cists and 5 undisturbed cairns are located in a flat area roughly 100m E-W x 150m N-S. There is a hill to the north-west of these and a small excavated water body to the west of the megaliths. The local residents refer to the megaliths as *Cholara kallu* (lit. “The stones of the Cholas”) and claim that some of the megaliths have disappeared over time.

4.5.4 The Kerala sites:

a. The Thrissur group of sites: Five of the sites visited at Thrissur were rock-cut burials with the two other sites having kudakkals, topikals and other typologies (Rao 1972, Satyamurthy 1992, Mathpal 1998). The rock-cut burials were studied at Eyyal (10° 39′ 27″N, 76° 07′ 09″E), Chowwannur (10° 39′ 22″N, 76° 04′ 57″E), Kakkad (10° 39′ 42″N, 76° 04′ 07″E), Kattankampil (10° 41′ 13″N, 76° 02′ 21″E) and Kandanasserry (10° 35′ 58″N, 76° 04′ 57″E), while the site at Ariyannoor (10° 36′ 20″N, 76° 05′ 07″E) had kudakkals. The site at Kudakkallu Parambu (10° 41′ 07″N, 76° 07′ 18″E) had kudakkals, topikals and multiple hood-stones as well as a single granite menhir, now fallen.
The rock-cut cave burial at Eyyal is a double chambered construction with two chambers on adjacent walls of a rectangular excavation into lateritic rock (Rao 1972, p. 49-50). The rock-cut tomb at Chowwannur is a single-chambered cave with a recessed entrance. The rock-cut burial chamber at Kakkad is also single-chambered, with an entrance on the east, and an opening on the roof of the cave. The burial cave at Kattankampal is four-chambered, with two chambers situated adjacent to each other facing east and the others facing north and south into a rectangular excavation. The cave at Kandanassery is a single-chambered construction with a circular floor and hemispherical dome-shaped roof with an opening above. The site at Kudakkallu Parambu has 3 intact kudakkals and several collapsed ones, with a few topikals and multiple hood stones, all made of laterite. There is also a fallen menhir of granite. The Ariyannoor site has 5 intact kudakkals and a couple of collapsed ones.
b. **Marayoor:** About 5km east of Marayoor and 50km north of Devikulam in the High Ranges of the Idukki district in Kerala are found several dolmens (Rao 1972, Mathpal 1998). They are known as *Muniyaras* (lit. “the chambers of the ascetics” in Malayalam) locally. More than 70 dolmens were found on various hilltops in the region (Rao 1972). Many have been destroyed since in development activities. During our visit in August 2006, at a hillside near the Kovilkadavu School, about half a dozen dolmens in various states of dilapidation were noted on the crest of the hill and another half-dozen on the flanks of the same hill. Interestingly, several of these have found uses in the current context – a couple as shrines to two different religious faiths and another one as a garbage bin.

4.5.5 **The sites of Vidarbha:** The region of Vidarbha in the present-day state of Maharashtra is characterised by the topography of the residual hill ranges of the Satpuras, with undulating black soil valleys between them. The plateau is drained by the Wardha and Wainganga valleys. The megaliths of Vidarbha are concentrated in the Bhandara, Nagpur and Chandrapur districts, which are known for their rich mineral deposits, especially raw iron, coal and manganese. The megaliths of Vidarbha are, on statistical analysis, a fairly homogenous group, consisting largely of stone circles, sometimes with cairn filling. However, there are great variations between sites with dolmens and menhirs seen at some sites and even variations in burial practices (Suvarathan 2010).

a. **Junapani:** Junapani (21° 11’ 59”N, 78° 59’ 58”E), lit. “stale water” in Marathi, is a single culture megalithic site near and north-west of Nagpur. The megaliths are all boulder circles or cairn circles, several hundred of them distributed in three groups. The site was visited for a comparative study with the southern megaliths.

b. **Nagbhid:** Nagbhid (20° 34’ 37”N, 79° 40’ 03”E) is a very different type of Vidarbhan megalithic site. It consists of 16 menhirs or remains of menhirs distributed in a flat field (Fig.4.11). Some of the menhirs are fallen and some are broken stumps and many more are presumably missing, judging by the incursions of buildings and other structures into the area defined by the megaliths. There is a hill on the east but the horizon is visible on the west but for the buildings. Nagbhid offered an excellent opportunity to compare and contrast the menhir sites of Karnataka.
c. Champa: The megalithic site of Champa (20° 58’ 42” N, 79° 11’ 48” E) is an unexcavated field of cairn and stone circles close to Nagbhid. This site which remains to be surveyed contains several hundred megaliths in a fairly intact condition. This site, too, was visited to compare the form and distribution of the megaliths with reference to the southern megaliths.

Figure 4.11: Showing the layout of menhirs at Nagbhid

Figure 4.12: Showing the megalithic site at Burzahoma
4.5.6 The site at Burzahoma, Kashmir Valley: Burzahoma (34° 10’ 00”N, 74° 54’ 30”E) in the Kashmir Valley is a well-known Neolithic site (Fig.4.12), first noticed by De Terra and Paterson in 1935 (Sharma 2000). In a short excavation, they brought forth a sequence of Neolithic, Megalithic and Early Historic cultures. On the basis of available C14 dates, it is believed that the megalithic phase in Kashmir occurred earlier than the subcontinent. The megalithic culture is believed to have brought rice and iron to the Valley in around 1850BC. The megalithic phase at Burzahoma is represented by the large menhirs, many of them fallen, and they are believed to be commemorative rather than sepulchral.

Our visit in February 2007 was to study the arrangement of the menhirs and formed a comparison to other menhir sites encountered later.

4.5.7 The site at Vadakkipatti, Tamil Nadu: The megalithic site at Vadakkipatti in Tanjavur district of Tamil Nadu was visited briefly to study the form of the boulder circles made of laterite to compare with similar monuments elsewhere.

4.6 Study Methods: The methods used to study the various monuments and the sites of their occurrence will be elaborated below.

4.6.1 Preliminary studies and pre-reconnaissance planning: Once the shortlist of sites was made, each site to be visited was studied from literature wherever available and the route to the site as well as features of the site and surroundings studied on Google Earth maps and Survey of India scale 1:50,000 and 1:25,000 topo-sheets. This was not always possible since the literature available was limited for many sites and even the route and location are not clear for several sites. The geo-co-ordinates given in the above section are all derived from GPS readings taken at the respective sites during this study (except Burzahoma, which was visited before the acquisition of the GPS and is taken from Sharma 2000). For whichever sites that could be observed on Google Earth (henceforth GE) the site features and surroundings as evident from the map were noted and the reconnaissance visit and surveys planned.

4.6.2 Reconnaissance visits and surveys: Reconnaissance visits were mainly to ascertain the continued presence of the monuments at given sites and, if present, the monuments and features were noted and orientations measured. For instance, sites at Kyaddigeri and Gudde Maradi were found to be completely devoid of any megaliths, including traces, and the monument at Konan
Kallu turned out to be non-megalithic, thus ruling out these sites from further studies. No measurements were made at the sites of Brahmagiri, Marayoor and Burzahoma since these sites were visited to get a feel of megalithic sites before the procurement of any equipment. During subsequent reconnaissance visits, the GPS position of each monument was noted using a Garmin GPSmap 60 instrument with a best accuracy of 17 feet. Distance measurements were made using a Leica Disto A3 laser disto-meter and measuring tapes. Orientations were measured using a Lawrence and Mayo prismatic compass with a least count of half-a-degree. However, the nature of the structures being measured have differing accuracies depending on the state of preservation and type of construction and will be discussed in the following section. Most of the sites encountered were either reasonably flat terrain or the monuments being studied did not require the topography to be studied. The monument at Nilaskal, where it was seen that the topography had a crucial role to play in the understanding of the monument, was surveyed using a total station and the monuments placed in their topographic setting. The sizes and vital measurements of important monuments and their components were measured. Finally, the azimuths of observed sightlines at two sites were confirmed using the prismatic compass.

4.6.3 Orientation survey methods: A very crucial measurement involved in this investigation was the measurement of the orientation of megalithic monuments, various components of these and the lines between various monuments or their components. A simple prismatic compass was used for this purpose. Clinometers were not used to find the vertical obstruction due to low hills etc. on the horizon because of the low altitudes involved. All sites were within the tropics except Burzahoma, where, as stated earlier measurements were not involved. However, it is stressed that when azimuths are measured at the site at Burzahoma, a clinometer should be used to evaluate the angular extent of obstruction due to a hill on the east. The basic idea is that, when an azimuth that is measured is compared with the angular extent of sunrise, sunset or any other celestial event calculated for the given latitude, errors would be registered at sufficiently high latitudes if the horizon is obstructed by any feature (say, a hill) which would mean that the azimuth line to the point of actual rise/set on the elevated horizon would be different. This, however, is minimal for the low latitudes encountered at all other sites in this study, since the plane of the diurnal arc of any celestial body for these latitudes is nearly perpendicular to the horizon plane (Fig. 4.13 a, b).
The prismatic compass has a least count of $0.5^\circ$, however the angular measures obtained by it have an accuracy of $2-3^\circ$ at best. This is because of the difficulty in establishing the axis whose azimuth is being established by the measurement (Hoskin 2001). The procedures followed for establishing an axis for the various kinds of monuments encountered in this study is elaborated below.

a. **Dolmens, dolmenoid cists and cists:** These are chambers constructed out of stone slabs. Though rectangular, they are seldom constructed to an accuracy of a few cm. Thus, establishing the axis of the monument to better than $2-3^\circ$ is not possible. During this study the orientation of the long axes of the rectangular chambers of these monuments
were measured (Fig. 4.14). If a porthole was present, the direction of the slab containing the porthole was deemed to be the direction faced by the monument.
A ranging rod is placed at the centre of the rear wall of the chamber (as measured inside) and another placed at the centre of the front wall and the azimuth for this line is measured. Care is taken to avoid magnetic anomalies by taking the reverse bearing of this line (it should be 180° + the forward bearing observed).

b. **Rock cut burial caves:** The measurement of the axes of rock-cut tombs is a tricky proposition, with the ambiguities in determining the axis sometimes being very difficult. However, the azimuth of the axis, once determined, is measured as indicated in Fig. 4.15.

c. **Kudakkals:** The kudakkals of Kerala are made of four clinostats (inclined curved members made of laterite) so that the plan of the arrangement is a circle. The massive hemispherical capstone is balanced atop this combination of four clinostats and has notches in the base to accommodate the tapered ends of these. I measured the orientation of the joints of the clinostats as indicated in Fig. 4.16, to check for any consistency in the way they are put together.

![Figure 4.15: Showing the measurement of the orientation of rock-cut tombs](image)
d. **Individual menhir:** Measuring the orientation of a single menhir is possible only if the menhir is a dressed slab or at least an elongated boulder set on end. For instance, the orientation of a menhir such as those at Vibhutihalli (Fig. 4.17) cannot be measured and thus was not even attempted. However, menhirs such as those at Nilaskal and Byse were measurable. A uniform approach was formulated to measure the orientations of these – the orientations of the eastern faces at the points where they met the ground were measured, whenever possible. This was to avoid the ambiguities that could arise from the inclination of some of the stones. Also, since the stones were roughly 25-40cm thick, inconsistencies can arise if the orientations other than that of the points on the same face of the menhirs are measured. The orientations were measured by placing ranging rods on the far ends of the same face of the stone (Fig. 4.18) and measuring the azimuth of that line with the prismatic compass (Fig. 4.19).
Figure 4.17: Showing the menhirs of Vibhuthihalli – orientation measurement is not possible for individual stones

Figure 4.18: Showing the placement of rods for measurement of orientation of a menhir at Nilaskal
Figure 4.19: Showing recording of the azimuth of a single menhir at Nilaskal

e. **Alignments and avenues:** For alignments and avenues, a different method was used for the type of alignment/avenue encountered. The alignments at Vibhutihalli and Hanamsagar consist of field boulders rolled down from the nearby hills and manoeuvred into position in a definite pattern. The accuracy of lines from one boulder to the next does not yield much information and are quite variable. The boulders seem to be distributed about a “best-fit line” whose orientation can be obtained by measuring the orientation of the best-fit line for all the boulders that are visible from one station point of the prismatic compass. The summary of such measurements is seen in Fig. 4.20 where the main measurements for the alignment at Hanamsagar are depicted. The more the number of boulders that can be included in each measurement, the more accurate would be the observations. As will be discussed in the next chapter, the measurements at Hanamsagar throws into dispute the accepted form of the alignment at Hanamsagar. For the alignments at Nilaskal and Byse, the bearings of each edge of one menhir from each edge of others were taken with the prismatic compass and the distance along each bearing measured with the disto-meter. The bearings of lines from the centre of each menhir to the centres of others were also taken (Fig. 4.21).
At Nilaskal, since the topography was deemed to be crucial to understanding of the site as a whole, as will be discussed in the next chapter, a total station survey was undertaken and the results compared with the prismatic compass survey and Google Earth maps taking into account major features.

![Figure 4.20: Showing the measurement of alignments at Hanamsagar](image1)

![Figure 4.21: Showing the measurement of azimuth of a sightline at Nilaskal](image2)

Of course, all bearings obtained with the prismatic compass are with respect to the magnetic north, and is not with respect to the geographic north – which is the true reference frame to
compare with when dealing with the diurnal motions of celestial objects. Hence all bearings were corrected for the true geographic directions as shown in Fig. 4.22. The magnetic declination (that is, the angular difference between the true and magnetic north point) was obtained for the date of survey for each site and the necessary corrections applied.

![Diagram showing magnetic declination and true bearing correction](image)

**Figure 4.22: Showing the correction for obtaining true azimuth from magnetic azimuth given by the magnetic compass**

The obtained azimuths were tested for sightlines to solar and lunar rise/set points for specific dates like the equinoxes, solstice, zenith passage etc. on the local horizon. Stellar sightlines were not tested because, given the datelines in archaeology and the number of bright (first magnitude) stars in the night sky, it would be possible to fit some star or the other to any given sightline (Ruggles, *Pers. Comm.*).

The observed sightlines corresponding to astronomical targets were first validated on field for topographical and other viability; then analysed statistically and otherwise for validity. Features of monuments and components were examined for possible astronomical use. The results of all surveys and these other examinations are laid out in detail in the next chapter.