Chapter - I
INTRODUCTION

Civilization begins with order, grows with liberty and dies in chaos
(c.f. Krieger, R. A. 2002: 204)

Archaeological researches in Gujarat during the last eighty years have contributed considerably to the general understanding of Harappan and regional Chalcolithic cultures/traditions. Since the accidental discovery of Chalcolithic material remains at Vallabhipur in 1930, more than 750 Chalcolithic sites were reported from various parts of Gujarat and among them 55 sites are excavated so far. As most of the reported Chalcolithic sites in Gujarat had elements of Harappan culture, without any doubt or second thought, all of them were labeled under the same and until the first half of 1980s Chalcolithic settlements of Gujarat were synonymous with the Harappan culture with very few exceptions.

The distinctive features of the material culture of the Chalcolithic site(s) in Gujarat in the early stages was observed by few scholars like Vats (1937), Dikshit (1950), Subbarao (1958), Nanavati (1962) and Wheeler (1959, 1966). Vats (1937) suggested that the part he excavated at Rangpur in Saurashtra might correspond to the Late period of the Indus Civilization or probably falls between that time and Cemetery H at Harappa. Thus began the belief that Chalcolithic sites in Saurashtra are Late Harappan (Possehl 2007: 303). In 1958 (fig. 37), Subbarao categorized the excavated Chalcolithic sites of Gujarat into three viz. Kathiawad Harappan (Lothal and Rangpur IIA), Late Kathiawad Harappan (Rangpur IIIB, Somnath IA and IB and Lakhabawal I) and Post Kathiawad Harappan (Rangpur IIC and III, Somnath II and Amra I). Though he hasn’t given any explanation for this classification it can be viewed as a division based on the concept of geographical region and differences in artifacts. Subbarao (1958: 132-133) also identified the typical
regional ceramic type known as Prabhas Ware along with the Harappan ceramics at Somnath. Wheeler (1959: 38) identified the distinctive character of the Chalcolithic sites in Kathiawar and called them as a sub-Indus or a provisional variant of the Indus Civilization. Nanavati (1962) suggested the possibility of Lothal being a regional variation of the Harappan culture in Gujarat, which may have dissociated from the parental one at an early stage and took its own course of development. Rao (1963) suggested the probable existence of an indigenous Micaceous Red pottery using Chalcolithic community at Lothal prior to the Harappan occupation. Wheeler (1966: 87) also used the term Saurashtraian Indus to denote a late and the developing branch of the Indus civilization.

The ceramics similar to those of Jorwe and Malwa culture were recovered from few excavated sites in south Gujarat along with the Post Urban Harappan pottery (IAR 1961-62; IAR 1966-67; Mehta et al. 1971). Joshi (1972: 122-126) noticed the variation of certain ceramics found associated with the Harappan pottery from Surkotada. Sankalia (1972: 171-172) regarded the trends observed through the material remains at Rangpur and Somnath as regional, ethnic and cultural forces which clearly differed from the Harappan way of life. He also suggested that changes in pottery shapes, techniques and decoration could not have indigenously evolved without some outside influence (Sankalia 1974: 381). Pandya (1983: 59-63) based on the evidence of Rangpur excavations by Dikshit (1950) and Rao (1963) argued that the local Chalcolithic communities may have preceded as well as co-existed with the Harappans. Allchin (1990: 30) suggested that the local settlements with a distinctive regional character were already established in Gujarat even before the arrival of the Harappans and later in time Post Urban Harappan features blended with the re-emerging local cultural style. Possehl and Herman (1990) noticed significant variations from the Classical Harappan in the material culture of Rojdi and many sites in Saurashtra. Possehl and Herman (1990: 314) termed this regional manifestation of the Harappan urban phase as Sorath Harappan, which is stylistically different from the Sindhi Harappan (urban phase
sites in Kachchh, Sind and Punjab) and clearly a part of the Harappan larger cultural whole. Allchin and Allchin (1997: 160-161) suggested the term Local Harappan instead of Sorath Harappan to this regional manifestation.

Shinde (1992a, 1992b) identified a new regional Chalcolithic assemblage at the lowest levels of Padri and termed it as Padri Ware/Padri Culture. Re-analysis of ceramics from Prabhas Patan (Dhavalikar and Possehl 1992) in Saurashtra also revealed the evidence for the existence of a regional Chalcolithic population well represented by the ceramic assemblage named as Pre-Prabhas. Excavations and explorations in various parts of north Gujarat carried out by the Maharaja Sayajirao University of Baroda clearly established the evidence of another regional Chalcolithic population termed as Anarta (Ajithprasad and Sonawane 1993; Sonawane and Ajithprasad 1994). Sites in North Gujarat and Saurashtra also revealed ceramics similar to those from Early Harappan levels at Amri, Nal, Kot Diji, Balakot and Dam Sadat (Hegde et al. 1988; Majumdar and Sonawane 1996-1997). Brief descriptions of various Chalcolithic cultures/traditions in Gujarat are given below.

**Anarta Tradition**

Anarta Assemblage is a Regional Chalcolithic tradition first reported as a distinctive ceramic group from North Gujarat. Its regional trait was first recognized in 1985 during the excavations at Nagwada in Surendrnagar district where regional ceramics were found associated with Urban Harappan elements. However, its independent nature as a Pre Urban Harappan ceramic tradition of north Gujarat was established only after the excavations at Loteshwara in Mehsana district in 1991-92 (Ajithprasad and Sonawane 1993; Sonawane and Ajithprasad 1994). It is also found associated with Pre Urban Harappan Burial pottery (Amri Nal type) at sites like Motipipli and Datrana and with Pre-Prabhas pottery at Datrana. This pottery tradition is represented by gritty red ware, fine red ware, burnished red ware and burnished grey/black wares. The vessels are hand/slow...
wheel made and forms include straight or convex sided bowls with incurved rims, basins with thick flaring rim, pots/jars with flaring rim, constricted neck and bulbous body. They are treated with red slip with paintings in red, black and white (Ajithprasad and Sonawane 1993; Sonawane and Ajithprasad 1994, Ajithprasad 2002). Apart from many sites in North Gujarat, it is also found associated with Urban Harappan artifacts at Shikarpur in Kachchh (Bhan and Ajithprasad 2008: 1-9; Bhan and Ajithprasad 2009: 1-9) and Bagasra in Saurashtra (Sonawane et al. 2003, Bhan et al. 2004). The non-Harappan ceramic tradition from all the periods (IA, IB and IC) of Surkotada is analogous with Anarta pottery. This tradition can be dated between 3700 BC – 1700 BC.

**Padri Ware/Padri Culture**

Pre-Prabhas Assemblage

Pre-Prabhas pottery is a non Harappan assemblage first unearthed in 1956-57 excavation at Prabhas Patan (Somnath) in Junagadh district. Period I at Prabhas Patan datable to 3000-2800 BC was characterised by the occurrence of corrugated or broadly incised ware along with a blade industry of agate and chalcedony with crested ridges (IAR 1956-57; Subbarao 1958, Dhavalikar and Possehl 1992) and suggested similarities with RGP IIB (IAR 1956-57). It is characterised by handmade pottery comprising of red ware, incised red ware, black and red ware and grey ware. The forms represented are wide mouthed jars, deep shallow basins, flat bottomed basin with flaring sides and incised rims (IAR 1971-72). Though Pre-Prabhas level was identified during 1970s re-excavations, the details of this ceramic type were published only in 1992 (Dhavalikar and Possehl 1992). The only other site in Saurashtra which yielded crude corrugated wares similar to those from the Somnath was Rojdi, where it occurred in the earliest levels (IAR 1957-58). The excavations at Datrana in Banaskantha district of North Gujarat also revealed Pre-Prabhas pottery in association with Anarta pottery, Pre Urban Harappan Burial pottery, crested ridge blades and cores of chalcedony, agate, jasper and chert and copper/bronze punch (Ajithprasad 2002).

Pre Urban Harappan Sindh Type Pottery

This kind of pottery was first reported during the excavations at Nagwada in 1985 (Ajithprasad 2002: 144). Both inhumation and symbolic burials were noticed in Period IA of the site. Red Ware, Pinkish Buff Ware and Grey Ware represented the symbolic burials. The vessels were made of well elutriated clay and the ceramics were slipped and painted (Majumdar and Sonawane 1996-1997: 16). Major shapes in this group are large bulbous pot with narrow flat base, a short and straight neck and flat rim, flasks or beaker shaped vases with sides converging into a narrow opening, beakers with slightly flaring rim, dish on stand with up turned rim, dish with no carination and shallow bowls (Ajithprasad 2002: 145).
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bulbous pot is painted at the rim with a thick dark band and at the shoulder with horizontal and wavy lines. Pipal leaf motif on one of the large pots is an important feature. These burial ceramics resemble the vessels recovered from the Pre Urban Harappan levels at Kot Diji, Amri, Dam Bhuti, Nal and Balakot (Hegde et al. 1988: 58; Ajithprasad 2002: 145). Such ceramics are also present in the cemetery at Surkotada in Kachchh (Joshi 1990; Possehl: 1997: 81-87). Subsequent excavations at Santhli, Datrana and Moti Pipli in north Gujarat also revealed these ceramics along with Anarta pottery. At Datrana, in the upper levels, it was also found associated with Pre-Prabhas assemblage. Ajithprasad (2008: 41; 2010) also reported these ceramics from three sites (Warodra, Shapur and Lohij) in Saurashtra. Dhavalikar (Dhavalikar 1984; IAR 1971-72) reported the presence of Harappan like ceramics in the Pre-Prabhas level at Prabhas patan. Based on the finds from Warodra, Shapur and Lohij, Ajithprasad (2008: 41) suggests that the Harappan like ceramics reported from Pre-Prabhas level at Prabhan Patan may be the Early Harappan Sind related pottery. The relative time period assigned to the burial ceramic is beginning of the third millennium BC (Majumdar and Sonawane 1996-1997: 20; Ajithprasad 2002: 147). Majumdar (1999: 194) based on the evidence from Nagwada, Moti Pipli, Datrana and Surkotada suggest a time bracket of 2800 BC to 2550 BC for the spread of Pre Urban Harappan Sindh Related Pottery and its authors to Kachchh and north Gujarat.

Black and Red Ware

In India, Black and Red Ware ceramics are reported from Chalcolithic, Megalithic and Early Historic contexts (Dey 2003: 131-136). According to many scholars dual colour in the ceramic is the result of inverted firing technique (Wheeler 1947; Sharma 1960; Subbarao 1961; Rao 1963). Black and Red Ware ceramics are reported from most of the Chalcolithic sites in Gujarat, and it was first reported from Rangpur (Dikshit 1950: 18-19). At Rangpur, these ceramics were reported from all the periods and the major shapes include bowl, jar and dish and some of
the bowls were painted using white colour (Rao 1963). Black and Red Ware ceramics are found associated with Micaceous Red Ware (Rao 1985), Classical Harappan (Rao 1985), Prabhas Ware (Rao 1985), Sorath Harappan (Sen 2009); Early Harappan Burial/Pre Urban Harappan Sindh Related Pottery (Majumdar 1999), Pre-Prabhas Assemblage (Dhavalikar and Possehl 1992), Anarta tradition (Ajithprasad and Sonawane 1994; Ajithprasad 2002), Lustrous Red Ware (Rao 1963; Rissman and Chitalwala 1990), Malwa Ware (Mehta et al. 1971) and Jorwe Ware (IAR 1961-62). There were certain similarities and dissimilarities in the shape and fabric of Black and Red Ware in different periods and cultures/traditions. In Chalcolithic Gujarat, chronologically it can be roughly placed between 3700 BC - 900 BC.

**Micaceous Red Ware**

S.R. Rao in 1963 described the possible existence of an indigenous Micaceous Red pottery using Chalcolithic population at Lothal prior to the Harappan occupation (Rao 1963, Ajithprasad 2002). In spite of several efforts, he hasn't found a stratum exclusively of Micaceous Red Ware (1985). This pottery type was found to increase in quantity in the lower levels of Lothal A but it was always associated with Harappan ceramics (IAR 1961-62). In fabric, surface treatment, forms and modeling this pottery shows non-Harappan features (Rao 1963; Dhavalikar and Possehl 1992; Herman and Krishnan 1994; Sonawane and Ajithprasad 1994). This hand/mould made pottery has a thick pink to light brown/grey glossy slip with smooth surface and appears as dusted with tiny mica particles. The vessel forms represented are convex sided bowl with or with stud handle, shallow dish-basin, globular jar, lamp, bottle and perforated jar. Similar pottery was also reported from Rangpur (Rao 1963). The excavations at Kanewal (Mehta et al. 1980) and Vagad (Sonawane and Mehta 1985) in the Bhal region strengthened the theory of the existence of Micaceous Red ware using community in the area around Gulf of Khambhat. Later explorations (Dimri 1998-99; Dimri 1999; Krishnan and Dimri
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2005; Dimri 2005) in the Bhogava, Sukha Bhadar and Lilka river basin also provided supporting evidence in the form of similar pottery. It is also reported in small quantities from excavated Chalcolithic sites like Rojdi, Nageshwar and Bagasra in Saurashtra, Desalpur in Kutch and Ratanpura in North Gujarat (Herman and Krishnan 1994, Dimri 1999). Chronologically it can be placed between 2500-2400 BC (Lothal A Phase I and Rojdi A) to 1800-1600 BC (Vagad IB).

Classical Harappan

Classical Harappan sites are mainly concentrated in the Kachchh region and represented by the excavated settlements of Dholavira, Desalpur, Surkotada, Pabumath, Kanmer, Juni Kuran, Shikarpur and Khirasara, Lothal, Rangpur IIA Nageswar and Bagasra in Saurashtra, Nagwada and Zekhda in North Gujarat and these sites have Classical Harappan features apart from the artefacts of regional Chalcolithic cultures/traditions (Bhan 1994: 79). Possehl (1992) called the Classical Harappan settlements as Sindhi Harappan. According to Sen (2009: 1) "the term 'Sindhi Harappan' used by Possehl, although originally meant to refer characteristic cultural traits generally found associated with the urban sites of the Harappa culture in the entire Indus valley, by default refers only to that of the Sindh region because the word Sindh/Sindhi has regional/ethnic connotations. The urban Harappan features are found not only in the Indus valley proper but also in the adjoining regions in the east, south and west". Many of the Classical Harappan sites were associated with the manufacture of specialized items of semi-precious stone, steatite, faience, shell and copper (Sonawane 2000: 141). Size of the sites varied from 60 hectares to less than 0.5 hectare. A number of Classical Harappan settlements are fortified and bipartite division is also present in some of them. Classical Harappan remains from the sites of Gujarat include goblets, beakers, S profile jar, copper tools, architecture with standardized sun dried/kiln baked bricks and dressed stone, cubical stone weights, seals with script and figures, long parallel chert blades of Rohri chert and terracotta triangular cakes (Sonawane
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2000: 141). Based on absolute and relative chronology Classical Harappan sites can be dated between 2600-1900 BC.

Sorath Harappan

Regional manifestation of the Urban Harappan phase in Saurashtra is popularly known as Sorath Harappan period (Possehl and Herman 1990). Radio carbon dates from Rojdi A and B showed that all the sites in Saurashtra having pottery similar to these two phases should be dated to the Urban Harappan Phase and not the Post-Urban Phase (Possehl 1992: 129). Ceramics and other tools associated with site of Rojdi A and B type are quite different in detail from those of the Urban Phase Harappans in Kachchh and Sindh. In Sorath Harappan, the vessel shapes were much alike the Harappans in the Sindh region. The classic black on red painting style is absent in them. Though there are no seals and little writing, there are weights and measures, etched carnelian beads and copper implements of Harappan type (Possehl 1992: 129). Apart from Saurashtra, Sorath Harappan artefacts are recovered from sites in Kachchh and North Gujarat. The average size of these settlements is estimated to 5.3 hectares (Possehl 1980) and these settlements are devoid of elaborate architecture showing proper plan and layout (Ajithprasad 2002: 85). Like the Classical Harapan settlements, some of the Sorath Harappan settlements are fortified and bipartite division is also present in some of them (Ajithprasad 2008: 83). According to Ajithprasad (2008) thickness of Sorath Harappan fortification walls are much lesser in comparison to the Classical Harappans and curvilinear and polygonal structures seem to be not the norm in Classical Urban Harappan sites. Till the beginning of 1990s Sorath Harappan sites were considered as Late Harappan or Post Urban Harappan, and they were classified to Period IIB-C or III of Rangpur Sequence. Possehl divided the Rangpur IIB sites as Sorath Harappan, IIC as Late Sorath Harappan and III as Lustrous Red Ware sites (c.f. Varma and Menon 1999: 9; Possehl 1999). Based on the absolute dates from Rojdi Sorath Harappan can be placed between 2600-1700 BC. However,
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the radio carbon dates from Padri suggest an earlier date of 3600 BC to Sorath Harappan.

Prabhas Assemblage

Period II at Prabhas Patan was marked by a different set of ceramics known as the Prabhas Ware and this was unearthed during the excavations in 1956 (Subbarao 1958; Nanavati et al. 1971; Dhavalikar and Possehl 1992). The characteristic Features of the Prabhas Ware were hemispherical bowls with slightly incurved and bevelled rim and medium size jars/pots with an everted short rim, incipient neck, wide shoulder and globular body (Ajithprasad 2002: 134). It is made of fine clay and treated with a thin greenish grey slip. It is decorated with faint violet or purple pigmenta and the decorative patterns, generally geometric forms like horizontal and vertical lines, dots and other forms, were executed in horizontal panels or registers at the rim or at the shoulder (Nanavati et al. 1971). This assemblage was associated with Black and Red Ware, Sorath Harappan and Classical Harappan pottery. Remains of stone structures, copper implements including a celt, steatite and faience beads, and a carved stone seal bearing images of several stylized deer indicate Harappan influence (Ajithprasad 2002: 134). Prabhas pottery has wide distribution in Saurashtra, and it was reported from the sites like Lothal, Rojdi, Amra and Lakhabaval. This assemblage is dated between 2200 BC to 1700 BC (Dhavalikar and Possehl 1992: 72).

Lustrous Red Ware

Lustrous Red Ware Ceramics are first reported during the excavations at Rangpur (Dikshit 1950: 3-55; Rao 1963). At the site, this ceramic type made its first appearance in Period IIC in limited quantity and Period III is noted for its exuberance (Rao 1963). These ceramics were later reported from many explored and excavated sites in Saurashtra, Kachchh, North Gujarat and South Gujarat. Generally, the fabric of Lustrous Red Ware is coarse with the rare occurrence of a fine variety (Rao 1963). These ceramics are treated with a bright slip and are
highly burnished, which results in a very shiny surface. Colour of these ceramics ranged from tan, orange, bright red to purple (Rissman and Chitalwala 1990). Major shapes in the same are bowl, basin, dish, pot/jar and dish on stand. In many sites, it is associated with Painted Black and Red Ware and Coarse Red Ware (Bhan 1994: 82). Based on absolute and relative chronology this ceramic group can be placed between 1900-1400 BC (Bhan 1994: 82; Sonawane 2002: 168).

**Malwa Ware**

Malwa culture was spread over a large part of central India in general and in Malwa, the western part of Madhya Pradesh, in particular (Ansari and Dhavalikar 1971: 345). More than hundred sites belonging to this culture were located in the valleys of Chambal, Narmada and Betwa and its tributaries (Misra 2001: 515). The excavations at Nagda, Kayatha, Navdatoli, Maheshwar, Eran and Mandasor revealed the evidence for the existence of Malwa culture (Dahvalikar 1979a: 236). The people of this culture built large rectangular houses and circular pit houses in wattle and daub, sun dried bricks and kiln baked bricks (Dhavalikar 1979a: 237-238; 1979b: 248; Misra 2001: 515). A defence wall of mud from Eran and drain of mud bricks from Nagda were also reported. A square pit unearthed from Navdatoli is interpreted as *yajnya kunda* (Sankalia et al. 1971). The economy of the Chalcolithic community of Malwa Culture was based on farming, hunting and fishing (Dhavalikar 1979b: 250). Burials of this period were unearthed from Daimabad and Inamgaon. The people of this culture had a specialized blade industry of chalcedony and agate, and they used copper tools (flat cells, spear head and swords with mid rib). The stone tools like penknife blades, parallel sided blades, points, lunates and triangles were used by them. They used semi-precious stone beads and copper rings and bangles as ornaments. Male and female terracotta figurines were also reported from many sites. This culture is characterized by wheel made black painted red pottery having orange-red slip. Simple and elaborate geometric designs in panels were painted using purple to brown-black...
pigment. The designs are usually confined to the upper half of vessels and it include both hatched or solid triangles, diamonds in rows, concentric circles and loops. In addition to the geometric pattern, there are some interesting animal motifs such as deer, crane and peacock. The common shapes in this Ware include lotta, jars with flaring mouths and a variety of bowls and dishes. Another important ceramic is the white painted Black and Red Ware, usually represented by bowls and dishes. The people also used a coarse handmade red/grey ware identical with that of the southern Neolithic (Dhavalikar 1979b: 249). Some ceramics showing affinity to the Malwa culture were unearthed from Jokha and Dhatva in south Gujarat and these sites are relatively dated to the 15th-10th century BC. Few ceramics from Jokha showed resemblance to the Malwa Ware reported from Navdatoli (Mehta et al. 1971: 14). At Jokha, Malwa Ware was associated with Jorwe Ware, Painted Red Ware, Buff Ware, Black and Red Ware and Painted Red Ware with black bands on white background. At Dhatva Malwa Ware was associated with Post Urban Harappan artifacts and Black and Red Ware. Few sherds of globular pots having flaring rim, medium fabric, cream colour and black painting were recovered from the site. The designs were mainly bands and wavy lines (Mehta et al. 1975: 29-31). Some of the sherds have corrugations on the exterior (Meht et al. 1975: 34). At Dhatwa Malwa Ware was associated with Black on Red Ware and Black and Red Ware (Mehta et al. 1975: 31). Radiocarbon dates from Navdatoli suggest a period between 1700 B.C. - 1450 B.C. for the duration of the Malwa culture.

Jorwe Ware

Jorwe culture is represented at more than 200 sites from Tapi valley in the north to Bhima valley in the south of western Maharashtra (Misra 2001: 517; Dhavalikar 1979b: 251; 1984: 63-80). Jorwe culture is divided into two phases, early Jorwe (1500–1200 B.C.) and late Jorwe (1200–900 B.C.). Based on structures, subsistence economy and materials used, Jorwe settlements can be classified into large regional
centres, villages, hamlets, farmsteads and camps. Largest settlement of Jorwe culture is Diamabad, which is 30 ha in size (Sali 1986). The early Jorwe houses were rectangular in plan but late Jorwe houses were small round huts. The animal remains from the Jorwe sites include cattle, sheep/goat, buffalo and pig. Copper objects found at different sites comprise of axes, chisels and fish hooks. Pottery kilns have been noticed at Inamgaon (Dhavalikar et al. 1988) and Daimabad (Sali 1986). The pottery was wheel made and well fired. The pots were painted in black on the red background with simple geometric motifs. The typical shapes are spouted jar and carinated bowl. A large number of human burials have been found at Inamgaon (Dhavalikar et al. 1988), Nevasa (Sankalia et al. 1960) and other sites both in the early and late Jorwe phases. Jorwe people worshiped both gods and goddesses, which are represented by baked as well as unbaked clay figurines. The goddesses are of two varieties, namely those with head and others without head (Misra 2001: 518). According to Dhavalikar (1997: 206-208) two clay male figurines from Inamgaon probably represent male deities. As per Dhavalikar (1979b: 251), Jorwe people had contacts with the Late Harappans and the Lustrous Red Ware users of Gujarat. At Jokha, Period I (circa 1500-900 BC) was marked by the occurrence of Jorwe Ware and Malwa Ware (IAR 1966-67). From Nagal, microlithic tools associated with Black and Red Ware and small fragments of Ochrous Red Ware similar to the ceramics from Jorwe were also recovered (IAR 1961-62).

**Problem of Study**

Though, it can be assumed that some of the regional Chalcolithic communities existed independently in early stages of Pre Urban Harappan period (3700-3000 BC), archaeological data from various excavated sites in Gujarat reveal their co-existence with Pre Urban Harappan (later stage), Urban Harappan and Post Urban Harappan people. Interestingly, co-existence of various regional cultures in Gujarat with that of different stages of Indus Civilization is not well explained yet.
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As per the current understanding, cultural relations between Gujarat, Sindh and Baluchistan (Majumdar 1999) started during later stage of Pre Urban Harappan period (circa. 3000 BC). The evidences of these relations are reflected in the Amri/Nal type of pottery recovered from the sites in north Gujarat and Saurashtra. However, it is difficult to find the roots of regional cultures within its contemporary cultural communities in Sindh and Baluchistan. At the same time there is lack of evidence to support the origin of indigenous Chalcolithic cultures or traditions within Gujarat. Ceramics, the key artifact of regional Chalcolithic cultures/traditions are different from those of Pre Urban Harappan Sindh Related pottery (Majumdar 1999; Ajithprasad 2002), Sindhi and Sorath Harappan (Possehl 1992) and Post Urban Harappan pottery (Bhan 1992) in Gujarat. In all studies till date, regional cultures/traditions of Gujarat were defined in terms of pottery whereas several other cultural aspects remain undefined. Therefore, it is imperative to have a detailed study in these lines. To understand the regional Chalcolithic cultures/traditions properly, it is necessary to assess their preceding and contemporary cultures; its geographical and chronological extend and characteristic features in Gujarat.

The major objectives of study are:

1. To systematically locate and record sites belonging to regional Chalcolithic cultures through explorations in selected sub-regions.

2. To identify the distribution pattern of indigenous Chalcolithic sites in Gujarat within specific geographical sub-regions.

3. To understand the chronological position of regional cultures/traditions in Gujarat and to reconstruct cultural sequence and regional stratigraphy.

4. To define the nature of regional Chalcolithic settlements and investigate into various aspects of its people and then compare them with various excavated Harappan sites in Gujarat.
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5. To investigate whether pottery types and associated finds from Chalcolithic sites in Gujarat represent any regional cultures/traditions and define each Chalcolithic ceramics from typological point of view.

Key Definitions and Concepts

The archaeological concepts and terms are theoretical tools used for organizing, understanding and interpreting the data and few of them are self explanatory and others need definition. Archaeological terminology is formulated with reference to context and scale and retains validity of meaning within such bounds. The terminology used in the discipline need to be unambiguous and appropriate for archaeological goals (Bhagat 2001: 8). Definitions of key terminologies used in the thesis are as follows.

Chalcolithic

The term Chalcolithic (also known as eneolithic) is generally used to describe the period of Prehistoric human cultural change i.e. the transition phase from the use of stone tools to the use of metals or the use of copper, bronze and other metals (excluding iron) and alloys, besides stone in tool making technology. After nearly 80 years of research on the Chalcolithic cultures/traditions of Gujarat, precise definition of characteristics and chronological boundaries of the period remains elusive. In the context of Gujarat, the term generally refers to farming communities which used copper/bronze tools and objects. Within Harappan realm it is used to describe Pre Urban Harappan and Post Urban Harappan sites as well as settlements contemporary to and in varying degrees affiliated with Classical Harappan (c.f. Rogersdotter 2006: vi). The Chalcolithic period in Gujarat roughly spans 3700-900 BC and is traditionally divided into three periods based on a combination of ceramic typology, other artefacts and radio carbon dates from different sites. This period is noted for the earliest use of copper/bronze objects, craft specialization, architectural structures including monumental buildings, defence system, establishment of various social groups, earliest cities and towns,
burial monuments and irrigation system. Though, all of these features fit well into the characteristics of Bronze Age/Copper Age, in order to avoid confusions and for more clarity in representing wide variety of artifacts of different groups of people excluding the Mesolithic community, existed in various parts of Gujarat between 3700-900 BC, the term Chalcolithic is used in this thesis. Chalcolithic period of Gujarat is represented by cultures/traditions namely Anarta tradition, Padri Ware, Black and Red Ware, Pre Urban Harappan Sindh Related Pottery, Pre-Prabhas Assemblage, Micaeous Red Ware, Classical Harappan, Sorath Harappan, Prabhas Ware, Lustrous Red Ware, Malwa Ware and Jorwe Ware.

Region
The last level in the nested hierarchy of spatial scales is the region (Gamble 2008: 141). In archaeology, many scholars used the term region in different ways. Archaeologists normally defined regions of interest only indirectly, often relying upon current constraints on their research, such as modern political boundaries or the budget available for fieldwork (Kantner 2008: 41). Kantner (2008: 42) opines that "many archaeologists confine their regional studies to landscapes bounded by prominent geographic features; this assumes that people in the past would have had similar criteria for defining their landscapes. Similarly, the use of a model of human settlement to identify a sociocultural or political region relies on the assumption that the model correctly represents the criteria that actually shaped that particular human landscape. Archaeologists are increasingly acknowledging that past boundaries between people, as well as the relationships between humans and the environment, were constantly changing".

According to Willey and Phillips (1958: 19-20) region is "a considerably larger unit of geographical space usually determined by the vagaries of archaeological history. In terms of the cultural aspect, generally speaking, it is a geographical space in which, at a given time a high degree of cultural homogeneity may be expected but not counted on". While, Kowalewski (2008: 226) defined region in its
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geographical sense, that is physiographic region and behavioural region. According to him (2008: 226) "traditionally, in geography regions are fairly large places. A drainage basin, a coastal plain, a mountain chain are examples of physiographic regions. A behavioural region is usually taken to encompass an interacting set of settlements or central places forming an integrated social whole. It contains multiple communities and one or more politically autonomous societies. It is more or less economically self-sufficient in most things, or it is more or less demographically autonomous. In classical geography a region takes in multiple central places that form a system, plus their hinterlands. Whether, physiographic or behavioural regions are open systems and their boundaries are more or less permeable or fuzzy, but they make sense as a whole internally and their boundaries make sense physiographically or behaviourally". Kantner (2008: 41) defined archaeological regions as "spaces for which meaningful relationships can be defined between past human behaviour, the material signatures people left behind, and/or the varied and dynamic physical and social contexts in which human activity occurred". According to Kantner (2008: 41-42) "regions are conceptualized at many different scales, from continental regions incorporating enormous area to localized regions centered on small drainage systems. Demarcation of regions is often determined by the specific questions and theoretical perspective guiding the research".

In Harappan/Chalcolithic studies, only limited number of scholars attempted to define the term region in which geographical and archaeological divisions sometimes does not fit properly. Many settlement of Indus Civilization are located in the areas well beyond the Indus river valley and to refer to the broader region that the civilization encompassed Mughal (1970) proposed the term Greater Indus Valley. To describe the Greater Indus Valley which covered an area of Northwestern South Asia ranging from 680,000 (Kenoyer 1991: 352) to 1,000,000 square kilometres (Jansen 2002: 105) Law II (2008: 62) used the terminology Greater Indus Region. Rao (1973: 3, 8-49) identified four provinces of the
Harappan Empire; eastern province consisted of Rajasthan and Uttar Pradesh, southern province included entire Gujarat, the western province extended over southern parts of Baluchistan and central province consisted of Sind and Punjab.

Fentress (1976: 28, 77) identified Sind and Punjab as two primary regions of Indus civilization and he noticed Mohen-jo Daro and Harappa, lying within their own but overlapping regional resource zones. Apart from Sind and Punjab, a third region with in the Harappan sphere identified by Possehl (1980:18) is the area approximately coterminous with the modern state of Gujarat. Flam (1981: 17-18) designated South Asia as area and Sindh as sub area of the research hand based on ecological and physiographic factors divided Sind into three regions namely, Lower Indus Basin, Kirthar Mountains and Piedmont Plain, and Sind Kohistan.

Kenoyer (1983: 18-40) geographically divided the area of Indus Civilization into six regions, they are the Upper Sindhu/Nara Plain, the Lower Sindhu/Nara Plain, the Sindhu/Nara Delta, the Western Coast, the Eastern Coast and the Peripheral Regions. Joshi (1984: 51-54) divided the area covered by Indus Civilization into six geographical regions/sectors namely northern (Punjab, type site: Harappa), eastern (Rajasthan and Haryana (type site: Kalibangan), central (Bahawalpur type site: Ganveriwala), Southern (Sind, type site: Mohenjo-Daro), south-western (Baluchistan type site: Kulli Harappan) and south-eastern (Gujarat, type site: Lothal).

Possehl (1992: 237-244) divided the Harappan cultural mosaic into six regions based on ceramics and subsistence pattern namely the Sindhi Harappan (lower Indus Valley and Kachchh extending up to Lothal), the Kulli Harappan (in the mountains of Southern Baluchistan and Gedrosia), the Saurashtra Harappan (Saurashtra), The Bahawalpur Harappan (midst of the Cholistan desert), the East Punjab Harappan (Banawali II in Haryana) and the Late Kot Dijian (Northwest frontier of Pakistan). However, later Possehl (1999: 269) identified seven regions of Indus Age, namely, the Central Region, the Gedrosia Region, the Southern
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Region, the Northwestern Region, The Northern Region, The Eastern Region and the Hakra Region. The southern region of Indus Age is coincident with the boundaries of the state of Gujarat (Possehl 1999: 327).

Subbarao (1958) identified the differential growth of regions in India that was marked by conflict between centrifugal and centripetal forces across a geographically and physiographically differentiated landscape. Accordingly, he (1958: 12) divided the country into three basic divisions under the titles area of attraction, areas of relative isolation and area of isolation and placed Gujarat under the category of area of relative isolation. Based on geographical criteria and ethnic composition Possehl (1999: 328) divided Gujarat into four sub-regions: the North Gujarat plain, South Gujarat, Kachchh and Saurashtra. In earlier period, these regions were known by names Anarta, Lata, Kaccha and Saurashtra respectively (Sankalia 1941: 4-6; Subbarao 1958: 128; Majumdar 1960: xvii-xviii).

Culture
Culture has a very broad meaning in Anthropology; according to Tylor (1871: 1) “Culture, or civilisation . . . is that complex whole which includes knowledge, belief, art, law, morals, custom and any other capabilities and habits acquired by man as a member of society”. For Leslie White culture is our extrasomatic means of adaptation. As per White (1959: 3, 78) “by culture we mean an extrasomatic, temporal continuum of things and events dependent upon symboling. . . . A mechanism whose function is to make life secure and continuous for groups and individuals of the human species”. In Clifford Geertz’s (1975: 5) words, “believing that . . . man is an animal suspended in webs of significance he himself has spun, I take culture to be those webs, and the analysis of it to be therefore not an experimental science in search of law but an interpretive one in search of meaning”. As per Kessing (1981: 68) “Culture . . . refers . . . to learned, accumulated experience. A culture . . . refers to those socially transmitted patterns for behaviour characteristic of a particular social group”.

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According to Gustav Kossinna (1926 c.f. Veit 1989: 39) archaeological culture is “clearly defined, sharply distinctive, bounded archaeological provinces correspond unquestioningly to the territories of particular peoples and tribes”. While, Childe’s (1929: v-vi) definition of culture is more popular, who interpreted culture as “we find certain types of remains – pots, implements, ornaments, burial rites and house forms – constantly recurring together. Such a complex of associated traits we shall term a ‘cultural group’ or just a ‘culture’. We assume that such a complex is the material expression of what today would be called a ‘people’.

In the context of Gujarat, most information concerning the Chalcolithic period is limited to objects of material culture. According to Gamble (2008: 100) “material culture can be defined as the objects, environments and worlds with which we interact and that surround us. The world we are born into is very much a material one that shapes and creates us. We will also contribute to it by, in our turn, creatively adding, arranging and subtracting elements within it. . . . We are both created by and creators of material culture”. According to McGuire (1992: 104) “material culture not only exists in a context, but it also helps form that context. It is not just backdrop; it is instead the stage and props for human action”. The division of Chalcolithic cultures of Indus Civilization, particularly in Gujarat, into different time periods like Early Harappan/Pre-Harappan/Pre-Urban Harappan/Regionalization Era, Mature Harappan/Harappan/Urban Harappan/Integration Era and Late Harappan/Post Harappan/Post Urban Harappan/Localization Era is based on material culture. According to Bhagat (2001: 12) in Gujarat “since pottery is the largest data set in most excavations, pottery sequences tend to be used provisionally as full-fledged cultural sequences and take on an interpretive role far beyond the information potential they possess being ceramics”.

**Tradition**

According to Renfrew and Bahn (2005: 46) tradition is “a set of practices linked
historically through time by inheritance based on social learning". (1967: 61) "tradition is marked by a long temporal duration with relatively little spatial extent. The tradition is a configuration of traits which has a very long life. Plotted in a space-time block, traditions would have very steep slopes". According to Haury (c.f. Eddy 1984: 92) "a tradition is an archaeological unit concept that persists in time but limited in space". But the definition aptly applicable to ceramics is contributed by Willey and Phillips (1958: 35), according to them a tradition "comprises a line, or a number of lines, of pottery development through time within the confines of a certain technique or decorative constant".

As per Shaffer (1992: 442) "a tradition refers to persistent configurations of basic technologies and cultural systems within the context of temporal and geographical continuity". Although an often highly diverse range of human adaptations existing over long spans of time may be encompassed within a tradition, they are all broadly related and collectively distinct from those of groups belonging to other traditions (Law 2008: 73). The traditions are subdivided into eras and phases (Shaffer 1992: 442). Eras are descriptive units in which cultural phases are grouped based on their general attributes (such as basic subsistence economy) and differing degrees of interaction/integration (Law 2008: 73). According to Shaffer (1992: 442) eras "do not have fixed boundaries in time and space, and more than one may co-exist contemporaneously within a tradition". The eras are made up of phases and phase can be defined as "the smallest analytical unit, and its major feature is a diagnostic ceramic style located at one or more sites during a particular time" (Shaffer 1992: 442). Shaffer (1992) considered Indus Civilization as a tradition and he suggested four-era system of the Indus tradition starts in the Early Food Producing Era (c. 7000-5500 B.C.), with the origins of plant and animal domestication. The three periods (Pre Urban/Early Harappan, Urban/Mature Harappan, and Post Urban/Late Harappan) that were commonly used in the literature are assimilated into three of Shaffer's subsequent eras, Regionalization
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(c. 5500-2600 BC), Integration (c. 2600-1900 BC), and Localization Eras (c. 1900-1300 BC).

Pre Urban Harappan (c. 3700-2600 BC)

The term Pre-Urban Harappan represents the period which precede the Urban or Mature Harappan period at sites like Mohenjo Daro, Harappa, Chanhu Daro and Kalibangan (Possehl 1992: 118). The term Pre Urban Harappan is roughly equivalent to the terminologies Pre-Harappan, Proto-Harappan, Antecedent Harappan, Early Harappan and Regionalization Era. The terms antecedent Harappan or Proto-Harappan used to represent the early occupation at Kalibangan lack proper definitions. The term Pre-Harappan is commonly applied to represent those material remains which are found stratigraphically below the Mature Harappan cultural relics. According to Mughal (1970: 5-6; 1990: 181) the term Pre-Harappan is misleading because it creates the impression that chronological gap exists between the Pre-Harappan period of the first half of the third millennium BC and the Mature period of Harappan culture belonging to the later half of the third millennium BC (middle of the fourth millennium BC). Therefore, based on radio carbon dates and commonalities and differences in artefacts Mughal used the term Early Harappan to represent materials found stratified below the Mature Harappan remains at Kot Diji, Amri, Kalibangan and in the pre-defence levels of Harappan and related material discovered at other sites assignable to the first half of the third millennium BC. Similarly, the formative early period of the Indus Civilization (c. 5500-2600 BC) is denoted as the Regionalization Era (shaffer 1992). In the Regionalization Era, the inhabitants of the Greater Indus Valley and adjacent areas developed their subsistence systems, technological know-hows, interregional interaction networks, and social hierarchies essential for the emergence of urban state-level society (Kenoyer 1991, 1994).

Till the second half of 1980s there was very little evidence for the Pre Urban Harappan sites in Gujarat. But the excavations and explorations in different
regions of Gujarat in the following period, relative and absolute dates from various sites and reanalysis of ceramics from previously excavated sites provided evidences for the existence of various cultures/traditions mainly represented by the ceramics known as Anarta tradition, Padri Ware, Early Harappan Burial/Pre Urban Harappan Sindh Related Pottery, Pre Prabhas Assemblage and Black and Red Ware (Table 1). Except the Burial/Sindh Related Pottery, none of the ceramic types of this period from Gujarat showed clear technological and stylistic similarities to the Pre Urban Harappan ceramics or later ceramics of the Indus Valley proper (Sonawane and Ajithprasad 1994; Ajithprasad 2002). In Gujarat, Pre Urban Harappan phase can be dated between c. 3700-2600 BC. Material remains from various sites show that regional cultures/traditions in Gujarat during this period maintained interaction networks with one another as well as with cultures in the Indus Valley proper (Kenoyer 1997; Kenoyer and Meadow 2000; Bhan 1994; Ajithprasad 2002; Possehl 2002).

**Urban Harappan (c. 2600-1900 BC)**

The term Urban Harappan is used to represent the developed stage of the Harappan culture beginning about the middle of third millennium BC (Possehl 1992). In the similar way the terms Harappan, Mature Harappan (Mughal 1970: 7) and Integration Era (Shaffer 1992) were used. According to Shaffer (1992) at the beginning of the Integration Era, most of the regional cultures of the Greater Indus Valley and adjoining regions, including Gujarat integrated into a wide spread urban society, Harappa Phase. Pronounced homogeneity in material culture of the urban society distributed over a vast area (Shaffer 1992), technologically complex craft activities, standardized weights and measures, use of un-deciphered script and maritime trade with Mesopotamia are the characteristic features of this period (Kenoyer 1998; Possehl 2002). This period is remarkable for the appearance of Harappa Phase sites in Gujarat, a region that had largely been
peripheral to the mainstream of Indus cultural developments during the Regionalization Era (Chase 2007).

Urban Harappan period in Gujarat was marked by huge urban centre like Dholavira to small sites of less than half hectare. At least fifteen sites of this period were surrounded by huge fortifications. Based on the similarities in the material culture of these sites to those of Indus Valley proper, sometimes they were interpreted as outposts or colonies (Bisht 1989; Joshi 1990; Dhavalikar 1994). Residents at many of the sites involved in craft activities, such as the production of stone beads and shell bangles (Bhan and Gowda 2003) and traded these objects to different sites. Apart from the Harappan artefacts, regional Chalcolithic artefacts were also unearthed from many sites of the Urban Harappan period. Many of the ceramic traditions of Pre Urban Harappan period continued to this period and some new traditions/cultures also emerged. This period was represented by the cultures or traditions namely Classical Harappan/Sindhi Harappan, Sorath Harappan, Anarta Tradition, Padri Ware, Black and Red Ware, Micaceous Red Ware and Prabhas Ware (Table 1). The Urban Harappan period in Gujarat can be dated between c. 2600-1900 BC.

Post Urban Harappan (c. 1900-900 BC)

The term Post Urban Harappan (Possehl 1992) is equivalent to the terminologies Late Harappan, Post Harappan and Localization Era which encompasses the period following the principal urban occupations at Mohenjo Daro, Harappa and the urban phase sites coincident with the period of literacy and the making of the classic Indus stamp seals (Possehl 1992: 118). During this period, the long distance/inter regional trade, one of the characteristics of Integration Era appears to have largely broken down and the major geographic regions that had been encompassed by the Urban Harappan period were differentiated from one another on the basis of ceramics and other aspects of material culture (Chase 2007). Production of inscribed steatite seals, standardized weights, stoneware bangles,
and Harappan architectural practices disappeared during this period (Kenoyer 1998: 173-185).

Post Urban Harappan period in Gujarat corresponds to Shaffer’s (1992) Rangpur Phase. Around four hundred sites belonging to this period have been reported from different parts of Gujarat. This period was represented by the cultures/traditions namely Late Sorath Harappan, Prabhas Ware, Black and Red Ware, Micaceous Red Ware, Lustrous Red Ware, Jorwe Ware and Malwa Ware (Table 1.1).

Table 1.1: Various Cultures/Traditions of Indus Valley Civilization in Gujarat

<table>
<thead>
<tr>
<th>Indus Civilization</th>
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<td>Pre Urban Harappan</td>
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<td>(c. 3700-2600 BC)</td>
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<td>Anarta</td>
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<td>Pre-Prabhas</td>
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<td>Post Urban Harappan</td>
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<td>(c. 1900-900 BC)</td>
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<td>Black and Red</td>
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<td>Micaceous Red</td>
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<td>Late Sorath Harappan</td>
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<td>Prabhas</td>
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<td>Lustrous Red</td>
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<td>Jorwe</td>
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<td>Malwa</td>
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During this Era, many of the Classical Harappan vessel forms became extinct, Rohri chert blades became very rare and they were substituted by smaller blades of chert and chalcedony (Sonawane 2002: 167). Terracotta beads became very common (Sonawane 2002: 167). Distinctive aspects of Harappan material culture such as chert weights, triangular terracotta cakes and steatite stamp seals decreased in frequency or disappeared altogether (Bhan 1989: 226; Sonawane 2000: 142). Deterioration in urban settlement pattern is noticeable (Sonawane 2000: 142) and there was a decrease in the average size of the settlements in Saurashtra (Bhan 1994: 82). The Post Urban Harappan period in Gujarat can be dated between c. 1900-900 BC.

Environmental Background of Gujarat

Archaeological researches in Gujarat during the last eighty years showed that Harappan and other regional Chalcolithic communities were distributed over various physiographic regions, ranging from arid to humid conditions. Though, main concentrations of different cultures/traditions were in certain regions they also spread to other physiographic realms. This shows the skill and adaptability of Chalcolithic communities in adjusting themselves within different environmental conditions. Selection of different places for settlement might be based on availability of food, potable water and accessibility to raw materials and finished products. However, archaeological data shows that many of the regions preferred by the Chalcolithic folk are presently not suitable for habitation. This phenomenon makes it essential to examine the characteristic features of different physiographic regions and archaeological material remains to understand the Chalcolithic subsistence pattern. In archaeology, environment means a number of factors interrelated i.e. combination of climate, soil, topography, fauna and flora (Brothwell and Higgs 1969: 93). The environment plays an important role in the formation and change of various cultures. Knowledge of the present natural environment is necessary in order to reconstruct past environments (Marathe
1981). Therefore, general aspect of the environment of various regions of Gujarat has been given for proper understanding.

Gujarat was an integral part of Bombay State throughout the period of British rule. As a result of the reorganization of States in 1956, Saurashtra and Kutch were merged in the Bombay State. On May 1, 1960, Bombay State was divided into the States of Maharashtra and Gujarat. Present Gujarat includes Mainland Gujarat (South, Central and North Gujarat), Saurashtra and Kachchh (Randhawa et al. 1968).

Gujarat extends on the west coast of India between 20° 10' and 24° 50' degrees north latitude and 68° 40' and 74° 40' degrees east longitude. In this thesis, the term Gujarat is used in two different ways: firstly, to indicate the land which is bounded by the Arabian Sea on the west, Rajasthan in the north and the east, Madhya Pradesh in the southeast, and Maharashtra in the south; and secondly, the larger language field in which Gujarati and its variations are spoken (Majumdar 1960). The total area of the State is 197841 sq. kilometers, constituting 6.4 per cent of the area of the Indian Union. According to the provisional estimates of the 2001 census, the State of Gujarat has a population of 50596992 crores approximately. Administratively, the state is a single unit and comprises of 26 districts. They are Ahmedabad, Amreli, Anand, Banaskantha, Bharuch, Bhavnagar, Dahod, Dang, Gandhinagar, Jamnagar, Junagadh, Kachchh, Kheda, Mehsana, Narmada, Navsari, Panchmahal, Patan, Porbandar, Rajkot, Sabarkantha, Surendranagar, Surat, Tap, Vadodara and Valsad.

Geomorphology

Geological Survey of India (2001: 3) divided Gujarat into six geomorphic units namely, the southern Aravallis and the adjoining hilly tract, the Deccan Plateau and the adjoining tract of southeastern Gujarat, the central plains of Gujarat, the Saurashtra Peninsula, the Kachchh Peninsula and the Rann of Kachchh. The state
has a long coast line of 1550 km from Sir Creek in the north-west to Umargao in the south-west and it borders the Central Plains of Gujarat, Kachchh Peninsula and Saurashtra Peninsula. In the north-eastern parts of the state the hill chain represent the southward continuation of Aravalli range. North-western parts of the state are occupied by Kachchh Peninsula and the Rann of Kachchh. The south-western parts of the state forms the Saurashtra (Kathiawad) Peninsula, while the south eastern part is occupied by the Deccan Plateau. An alluvial tract covers the area spreading in north-south direction and lying between Aravalli range and Saurashtra – Kachchh Peninsula (Geological Survey of India 2001: 2).

According to Merh (1995: 1) Gujarat comprises three distinct geomorphic zones namely, Mainland Gujarat, Saurashtra and Kachchh and these zones are marked by its respective coastlines (Map 1.1).

Map 1.1: Geomorphic Map of Gujarat (Adapted: Chamyal et al. 2003: 72)
Mainland Gujarat

Mainland Gujarat is chiefly occupied by a flat alluvial plain bordered by the Aravalli and Trappean highlands to the east (Chamyal et al. 2003: 71-72). Geomorphologically, Merh (1995: 3-4) divided it into two zones namely Eastern Rocky Highlands and the Western Alluvial Plains. The Eastern Rocky Highlands show an altitude range of 300 to 1100 m and it is the extensions of the major mountains of western India - the Sahyadri, the Satpura and the Aravalli. The Western Alluvial Plains comprise a thick pile of unconsolidated sediments deposited by both fluvial and aeolian agencies primarily during the Quaternary period. This form the western half of the Mainland including coastal plains and show an altitude range of 25 to 75 m with a gradual seaward slope (Merh 1995: 3-4; Merh and Chamyal 1997: 3-4). According to Maurya et al. (2000: 348-350) and Chamyal et al. (2003: 71-72) Mainland Gujarat is divisible into four broad geomorphological zones namely the eastern upland zone, the shallow buried pediment zone, the alluvial zone (basinal zone) and the coastal zone. The eastern upland zone comprises rocks belonging to the Precambrian Aravalli Supergroup and Crataceous Deccan Trap and Bagh and Lameta Beds. The Aravalli includes complexly folded quartzites, schists, phyllites, gneisses and granites. While the Deccan Trap comprises various types of basalts and the Bagh-Lameta Beds are made up of sandstones with limestones (Maurya et al. 2000: 348). The eastern part of the plain is dominantly a shallow buried pediment as evident from the outcrops and hard rocks comprising the upland zone within the river channels. The pediment zone is very wide and has a shallow cover of quarterly sediments rarely exceeding 15 m (Maurya et al 2000: 348-350). The basinal zone hosts the Quaternary basin-fill exceeding 800 m in maximum thickness. The alluvial plain is a flat terrain and outside the Cambay basin the quaternary deposits directly overlie the basement rocks. North of the Banas, the arid land forms become very common. Though the occurrence of stabilized sand dunes decreases southwards, they are found to occur up to the Narmada river and this Aeolian feature given rise
to an undulated topography. The area between the Little Rann and the Gulf of Khambhat is a low lying and at various places it is marshy and salt waste land due to the retreat of the sea accompanied by tectonic uplift. The coastal zone is marked by the broad esturine mouths of the rivers Narmada, Mahi, Dhadhar, Sabarmati and number of creeks and extensive mud flats. The width of the Narmada estuary near the Gulf of Khambhat is around 18 km. Gulf of Khambhat is characterised by many sandy stretches which are influenced by marine as well as river action. It is enclosed on all sides by marshy coasts and dotted with tidal mudflats and several bars and islands locally known as Bets (Maurya et al. 2000: 350).

**Saurashtra**

The Saurashtra peninsula forms a rocky tableland fringed by coastal plains and a major portion of the same is occupied by the Deccan lava flows (Merh 1995: 4). The modern surface configuration, the types of landforms, the characters of drainage and the pattern of relief of Saurashtra have evolved from the geological base, in response to tectonic movements and the erosion history of the region (Dikshit 1970, Marathe 1981: 7). Based on the height above sea-level, the slope and ruggedness of relief, Saurashtra Peninsula can be divided into three geomorphic units namely the coastal low-lands, the plateau of Saurashtra and the hilly region (Pappu and Marathe, 1977). The Coastal Low-lands includes the area lying below the altitude of 75m. The Gulf of Cambay coast is very irregular in its outline and projects deeply inland. The Gulf is surrounded on all sides by marshy coast and dotted with bars and islands locally known as bets. Similar features are noticeable in the east coast of Saurashtra while the west coast is smooth with few indentations. All along the coast marshy depressions have developed due to the drainage blockage by coastal dunes and bars and the most extensive marshy low-land is between Porbandar and Navi-bandar spreading more than 200 sq. km. On the northern coast tidal flats are quite common, but there are hardly any dunes (Marathe 1981). The Plateau of Saurashtra includes the area lying between an
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altitude range of 75 to 300 m and rises gently from all the sides towards the centre. Though termed as the Saurashtra plateau, the Manda hills in the north and the Gir ranges to the south are joined by a narrow zone of higher altitude including the isolated and rounded hills like Girnar and Barda. It represents the relics of a much higher plateau subjected to erosion by the numerous rivers which flow from it in all directions (Marathe 1981). The Hilly Region is the part of Saurashtra which lies above 300 m and the highest point is represented by the Gorakhnath peak (1117 m) of the Girnar hills. The northern part of the highland occurs east of Rajkot near Chotila (340 m), which is an extension of the Manda hills. The Gir ranges exceed 300 m and are represented by several hills namely, Kanara (326 m), Sasa (480 m) and Nandivela (529 m and the Sarkala (643 m). The other hills which appear prominently in the landscape are the Barda hills (637 m) and the Alech hills (298 m) (Marathe 1981).

Kachchh

According to Merh (1995: 5) the Kachchh region is made up of east-west trending hill ranges in the island belt consisting of Pachchham, Khadir, Bela and Chorar islands, the Kachchh Mainland and the Wagadhighland (Merh 1995: 5). The hill ranges in these areas are separated by large tracts of low ground. All hill ranges and the intervening low ground run almost parallel, indicating that the topography has been controlled to a large extent by the geological factors of folding, faulting and lithology. The highest peak in Kachchh is Kaladungar (465 m) in the Pachcham Island. Kachchh can be sub divided into four geomorphic units namely, the Rann, the Low-lying Banni Plains, the Hilly Regions and the Southern Coastal Plains (Merh 1995: 5; Chamyal et al. 2003: 74). The Rann is salt-encrusted wasteland rising about 2-6 m amsl and covers approximately 45000 sq. km. area (Maurya et al. 2009: 71). It is divided by the rocky highland into the Great Rann to the north and the Little Rann to the east (Merh 1995). The Great Rann of Kachchh is a vast partially dry, mud flat extending from the north of
Mainland to the sand dunes of Thar Parkar in Pakistan and the Little Rann is the head of Gulf of Kachchh formed by the regression of sea (Biswas 1993: 18). Both the Ranns are flooded seasonally during the monsoon (Biswas 1993: 18; Merh 1995). The Low-lying Banni Plains is situated at a higher level than the Rann and forms shrubby and grassland area, connecting the Mainland and Pachham Island. It divides the southern extension of Great Rann into eastern and western halves. The western half extends to the Arabian Sea and near the sea it becomes the marshy tidal flat of Kori and Sir Creeks. The eastern half forms the marshy plain between Khadir Wagad and the Mainland (Biswas 1993: 18). The hilly regions consist of three units, the Island belt, the Wagad and the Kachchh Mainland. The island belt includes four rocky projections of Pachcham, Khadir, Bela and Chorar rising above the Rann. Wagad region lies to the northeast of the mainland and forms an isolated rocky landmass. The rocky mainland lies to the south of Banni and extends up to the Gulf of Kachchh (Merh 1995). The southern coastal plains border the mainland against the Gulf of Kachchh in the south and the Arabian Sea in the west (Merh 1995).

**Drainage**

Drainage is the reflection of the terrain characteristics and controlled by geomorphology, climate and tectonic framework (Merh 1995: 11). The rivers (fig. 1.2) in the various regions of Gujarat behave differently and show striking diversity.

**Mainland Gujarat**

North Gujarat has a number of rivers, the most important of which is the Sabarmati (400 Kms). For a considerable length of its course it is known as the Sabar but after its confluence with the Hathmati, it becomes the Sabarmati. The rivers like Rupen, Saraswati and Banas arise from south-western slopes of the Aravalli hills and flow into the Rann of Kachchh. The plains of central Gujarat
lying between Sabarmati and Mahi are drained by a number of tributaries of Sabarmati, viz., Khari, Shedhi, Mejan, Andheri, Meswo and Vatrak. Mahi is the third largest river of Gujarat after Narmada and Tapi and it flows into the Gulf of Khambhat. The river Dhadhar rising from the Shivrajpur hills also flows into the Gulf of Khambhat. This river is met by a major tributary Vishwamitri, 25 km SW of Vadodara. Major rivers of South Gujarat are Tapi (flows into Arabian sea) and Narmada (flows into Gulf of Khambhat). The Kim river rises in the Rajpipla hills and flows into the Gulf of Khambhat. The Orsang, Karjan, Kaveri, Amravati and Bhukhi are the tributaries of Narmada. The rivers Damanganga, Kolak, Par, Purna, Auranga, Ambica and Mindhola of South Gujarat are smaller in size and rise within the boundaries of the state from the eastern trappean highlands (Randhawa et al. 1968; Merh 1995).
Saurashtra

Though there are as many as 51 rivers in Saurashtra only seven rivers have a course of more than 80 kilometres. The two largest rivers of the region, the Bhadar and the Shatrunji rising opposite each other on the west and east sides of the plateau, flow through the plains, the Bhadar (260 km) westward to the Arabian Sea and the Shatrunji eastward to the Gulf of Cambay. Karnal, Utavali, Phophal, Moj, Vinu, Minsar and Ojat/Ozat are the tributaries of river Bhadar. The tributaries of the river Shatrunji are Satali, Singavadu and Gagaria. The streams flowing into the Gulf of Kachchh are comparatively smaller and these include Ghi, Sinhan, Fuljar, Sasoi, Ragmati, Nagmati, Ruparel, Kankavati, Und, Aji, Demai, Machhu, Godadhro, Bambhan, Phulka and Chandrabhaga. Rivers of the southern coast of Saurashtra are Dhanvantri, Raval, Machundri, Singoda, Hiran and Saraswati. Amongst the east flowing rivers that meet the Gulf of Kambhat are Kalubhar, Sukhbhadar and Bhogavo (Randhawa et al. 1968; Merh 1995).

Kachchh

Most of the rivers in Kachchh flow for short distances and carry little water. The south flowing streams like Naira, Kankawati, Choke, Sie, Vengdi, Kharod, Rukmavati, Khari, Nagwanti, Pardi, Bhukhi, Mitti, Sakra and south-westward flowing streams like Rakhdi and Mitti meet the Arabian sea. The streams originating from the northern slopes that meet the Rann of Kachchh (Banni) are Nara, Panjarwati, Chhari, Bhukhi, Tramdo, Kaila, Pur and Kasawali. East flowing rivers like Sing and Sakra meet the Gulf of Kachchh near the mouth of Little Rann of Kachchh (Randhawa et al. 1968; Merh 1995).

Geology

The geological evolution of Gujarat started in the Triassic with the breakup of Gondwanaland and the subsequent geological history is related to the northward drift of the Indian subcontinent (Merh and Chamyal 1997: 10). Gujarat comprises
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of the rocks belonging to the Precambrian, Mesozoic and Cenozoic Eras (Map 1.3). The Sediments of Quaternary period cover about 51% of the total area of Gujarat, the rest being occupied by the hard rocks. The hard rocks comprise Precambrian metamorphites and associated intrusive, sedimentary rocks of Mesozoic and Cenozoic Eras and the traps/flows constituting Deccan volcanic of Cretaceous - Eocene Age (Geological Survey of India 2001: 4).

Minerals

Different minerals available in various parts of Gujarat are agate, barite, bauxite, bentonite, beryl, feldspar, fluorite, fuller’s earth, glass sand, gold, graphite, ochre, petroleum, phosphorite, poly-metallic base metal, quartz, salt (brine), calcite, chalk, clay, coal, copper, diatomite, dolomite, gypsum, lignite, limestone, manganese, marble, mica, nickel, siderite, talc (soapstone), tin, tungsten, vermiculite and wollastonite (Map. 1.3). Many of these minerals are exploiting for commercial purposes and different kinds of rocks are being used for construction activities (Geological Survey of India 2001: 45).

Soils

Merh (1995: 16) divided the soil types of Gujarat into five namely entisols, inceptisols, vertisols, aridisols and alfisols (Map 1.4). Vertisols are locally knows as Regur or Black cotton soil and it occur in district of Bharuch, Surat, Valsad, Mehsana, estern Ahmedabad, northern Kheda, Vadodara, Bhal and Ghed tracts of Saurashta where the annual precipitation ranges from 500-2000 mm (Randhawa et al. 1968: 166-172; Merh 1995: 16). Its colour varies from deep black, dark brown and dark greyish brown. Aridisols have mainly developed over the aeolian silts and dune sands and distributed in the flood plains, pediment surfaces, mud flats and small dunes of Kachchhh, North Gujarat and Central Gujarat where the annual rainfall is below 450 mm. The colour of this soil ranges from light grey to brown. Alfisols have developed mainly over sandstone deposits and at places over alluvial deposit. This soil type is mainly found in the central Banaskantha and
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Map 1.3: Geological and Mineral Map of Gujarat (Adapted: Geological Survey of India 2001: Plate I)
north-eastern parts of Surendranagar district where the annual rainfall is between 500-700 mm. The colour of this soil ranges from red to reddish brown. Entisols are developed over traps, granite, gneiss, quartzite and alluviam and are seen in Saurashtra, North Gujarat and parts of Kachchh and Mainland Gujarat where annual rainfall is between 55–950 mm. The colour of the soil varies from light grey, greyish brown and reddish brown. Inceptisols are mainly found in parts of Sabarkantha, Panchmahal, Rajkot, Surendranagar, Jamnagar, Bhavnagar, southern part of Ahmedabad, north Mehsana, southeastern Banaskantha, parts of Central Gujarat and along the coastal plains where annual precipitation is between 500-2000 mm. These are formed over basaltic, granitic, gneissic and alluvial parents and its colour varies from dark grey to light grey, reddish brown, yellowish red and dark reddish brown (Merh 1995: 16-20). Based on soil types, climate, rainfall and temperature, Gujarat is divided into five agricultural zones namely Kachchh,
Suarashtra, North Gujarat, Central Gujarat and South Gujarat (Randhawa et al. 1968: 165).

Climate

Gujarat is located astride the Tropic of Cancer and forms an important part of the drylands of western India bordering the Thar Desert (Chamyal et al. 2003: 70). The climatic condition of the state is greatly influenced by the topography and monsoon. On the basis of climate Gujarat is divided into four major zones namely, dry sub-humid, semi arid, arid and extremely arid (Chamyal et al. 2003: 70). Most parts of the state falls in the semi arid climatic zone merging with the arid zone in the north and northwest (Map 1.5). Different seasons of Gujarat are winter (November to February), summer (March to Middle of June) and monsoon (middle of June to October) (Randhawa et al. 1968: 169; Merh 1995: 10). Temperature of the state during summer reaches as high as 45° C (occasionally 48° C in some parts) and during winter minimum temperature of the remaining around 6° C (occasionally drops to 2° C in some parts) (Merh 1995: 10; Marathe 1981: 24; Sant 1999: 343). The winds experienced in the state are generally light to moderate and its intensity increases during the late summer and monsoon season. The winds blow from West or South West during the monsoon season and North East to North West from October to April (Merh 1995: 11).

Rainfall

Gujarat receives most of its rainfall from the southwest monsoon during the period between June and September and its distribution is uneven Map 1.6) in different parts of the state (Merh 1995: 10; Chamyal et al. 2003: 71). Southern part of the state receives annual rainfall above 2000 mm. The rainfall gradually decreases northward and in the northwest it goes below 300 mm (Randhawa et al. 1968: 166-172; Merh 1995: 10). Based on annual rainfall, Merh (1995: 10-11) divided the state into four zones having rainfall above 1000 mm (districts of Valsad, Dangs, Surat and eastern parts of Bharuch), rainfall between 800 mm and 1000 mm
districts of Vadodara, Panchmahals, Kheda and southern part of Ahmedabad), rainfall between 400 mm and 800 mm (whole Saurashtra and northern part of Ahmedabad district) and rainfall less than 400 mm (districts of Kachchh, Banaskantha and western part of Sabarkantha). Relative humidity in all parts of the state is low, while in the coastal area it is moderately high (Randhawa et al. 1968: 166-172; Merh 1995: 11).

Ground Water

The availability and quality of the Ground water in different parts of Gujarat is inconsistent and depends on rainfall, topography and hydrogeological setting. Ground water occurs in three geomorphological settings namely hilly tracts of the
Mainland, tablelands of Saurashtra and Kachchh and alluvial plains (Merh 1995: 20-21). Water suitable for drinking and irrigation purposes in the hilly tracts of the mainland is available from 4 to 10 m below the ground level, in alluvial plains it ranges from 5 to 35 m from the surface while in the tablelands of Saurashtra and Kachchh it ranges from 10 to 25 m below the ground level. Ground water in most of the coastal areas and Rann of Kachchh is highly saline and unsuitable for household purposes and agriculture ((Merh 1995: 21).

**Flora**

Based on the vegetation data, the state of Gujarat can be divided into three zones, namely the well wooded area south of the river Narmada consisting of moist and dry deciduous forests with teak as the main economic species, the area between the river Narmada to the extreme north excluding Saurashtra and Kachchh
covering inferior dry deciduous forests with or without teak and the area of Saurashtra and Kachchh with poor teak forests in Junagadh and Gir and in other areas scrub lands, mangrove forests and desert areas (Gujarat State Gazetteer I 1989: 48). Forest covers 19535 sq. km. of the total area of the state. The forests of the state can be divided into five main types as moist deciduous forests, dry mixed deciduous forests, dry scrub forests, mangrove forests and coastal forests (Gujarat State Gazetteer I 1989: 49-50). Moist deciduous forests occur in the states of Valsad, Dangs and Surat districts and these forests form the main source commercial timber in the state. Dry deciduous forests occur in the Bharuch, Vadodara, Panchmahal, Sabarkantha, Amreli, Junagadh and Jamnagar districts and the trees grows are low quality teak, timber, bamboo and firewood. Dry scrub forests are seen in Banaskantha, Rajkot, Bhavnagar, Junagadh and Kachchh districts and it contains sparse growth of Acacia spp. (Goarad and Harmo), Zizyphus spp. (Bor), Anogeissus pendula (Kala dhav), Azadirachta indica (Limbdo), Butes monosperma (Khakhro), Soymida febrifuga (Rayan), Cassia fistula (Garmalo), Prosopis juliflora (Gando baval), Dendrocalamus strictus (Manvelvans) and other thorny and bushy shrubs and small trees. Grasses are seen all over where the forests are open. Mangrove forests are seen in the coastal creeks of Gujarat and the main species is Avicennia officinalis (Cher). The coastal forests are the man made forests found in the coastal strips in Valsad, Surat, Bharuch, Bhavnagar, Jamnagar, Junagadh, Porbandar, Amreli and Kachchh districts. In the area bordering the deserts and in patches in deserts there are man made forests of Prosopis juliflora (Gando baval) (Gujarat State Gazetteer I 1989: 49-50). Important forest products from the state are timber, firewood, bamboos, grass, timru leaves, gum, mahuda flowers and fruits, Amli, Bor, Mango, Jambu, Charoli, and oil seeds like Karanj and Neem, grasses like Rosha grass and honey and wax (Gujarat State Gazetteer I 1989: 50). Some of the medicinal plants grown in the forests are Boerhavia chinensis (Punarnava), Cassia fistula (Garmalo), Terminalia belerica
(Baheda), Terminalia *chebula* (Harda), Cymbopogom *martini* (Rosha) and *Aloe vera* (Kunvar) Gujarat State Gazetteer I 1989: 51).

**Fauna**

Gujarat is home to different species of wild animals like Asiatic Lion (*Panthera leo persica*), Blue Bull (*Boselaphus tragocamelus*), Wild Ass (*Equus hemionus*), Mongoose (*Herpestes auropunctatus*), Porcupine (*Hystrix indica*), Black Buck (*Antilope cervicapra*), Four Horned Antelope (*Tetracerus quadricornis*), Pale Hegde Hog (*Paraechinus microps*), Gazelle (*Gazella gazella*), Hyaena (*Hyaena hyaena*), Wolf (*Canis lupus*), Jackal (*Canis aureus*), Fox (*Vulpus bengalensis*), Wild Cat (*Felis chaus*), Wild Boar (*Sus scrofa*), Grey Musk Shrew (*Suncus murinus*), Indian Tree Shrews (*Anathana elliotii*), Langur (*Presbytis entellus*), Pangolin (*Manis crassicaudata*), Indian Hare (*Lepus nigricollis*), Mongoose (*Herpestes edwardsi*), Mouse (*Vandeleuria oleracea*) and Indian Gerbille (*Meriones hurrianus*). Besides these animals, cattle (*Bos indicus*), sheep (*Capra hircus*), goat (*Ovis aries*), buffalo (*Bubalus bubalis*), camel (*Camelus dromedaries*), domestic pig (*Sus domesticus*), domestic Dog (*Canis familiaris*), domestic Cat (*Felis domesticus*), Horse (*Equus caballus*) and Ass (*Equus asinus*) are common in Gujarat (Gujarat State Gazetteer I 1989: 53-61).


The birds normally found in Gujarat are Ruddy Sheldrake (*Casarca ferruginea*), Bulbul (*Pychonotus spp.*), Eastern Common Crane (*Grus grus jerdoni*), Jerdon's

The aquafauna from the state include prawn (*Penaeus indicus*), fishes like Palva (*Hilsa ilisha*), Pomfret (*Pampus argenteus*), Mullet (*Mugil cephalus*), Bombay Duck (*Harpadon nehereus*), Trichurus (*Monacanthus trichurus*), Cuttle Fish (*Sepia spp.*), Squid (*Loligo duvauceli*), Mandeli (*Coilia dussumieri*), Long Spine Sea-bream (*Argyrops spinifer*), Green Mussel (*Penna vindis*), Chank (*Xancus pyrurii*), Pearl-Oysters (*Pteria vulgaris*) and Windowpane Oyster (*Placenta placenta*). Killer Whale (*Orcinus orca*), Dolphins (*Sotalia plumbea* and *Stenella longirostris*) and Sea Cow (*Dugong dugon*) were reported from Gujarat waters (Gujarat State Gazetteer I 1989: 61-62, 68-69).

**Agriculture**

Majority of the population in the state are engaged in agriculture characterized by dry farming as their primary subsistence economy, supplemented by varying degree of animal husbandry. Crops grown in Gujarat falls in two categories Rabi (winter crop) and Kharif (monsoon crop). Rabi crops need proper irrigation and it includes wheat (*Triticum aestivum*), and gram (*Cicer arietinum*). Vegetables such as cabbage (*Brassica oleracea var. capitata*), cauliflower (*Brassica oleracea var. botrytis*), peas (*Pisum sativum*), brinjal (*Solanum melongena*), tomato (*Lycopersicon aesculentum*), chilli (*Capsicum annuum*), beans (*Vigna*
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unguiculata), fenugreek (Trigonella foenum-graecum), garlic (Allium sativum), onion (Allium cepa), carrot (Daucus carota) and sweet potato (Ipomoea batatas) are grown. The Kharif crops are Bajra (Pennisetum typhoideum), Jowar (Sorghum bicolor), groundnut (Arachis hypogaea), sesame (Sesamum indicum) and maize (Zea mays). Paddy (Oryza sativa) is grown where adequate irrigation facilities are available. Vegetables like okra (Abelmoschus esculentus), cluster bean (Cyanopsis tetragonolobus) and cowpea (Vigna sinensis) are grown in summer. Cotton (Gossypium spp), Sugarcane (Saccharum officinarum) and tobacco (Lobelia inflata) are cultivated in large scale in different parts of the state. Large number of pulses like greengram (Vigna radiata), kidney bean (Phaseolus vulgaris), black gram (Phaseolus mungo) and oil seeds like castor (Ricinus communis) also cultivated in the state. In South Gujarat Banana (Musa acuminata), Sapota (Manikara zapota) and different varieties Mango (Mangifera indica) are grown in large scale. At Panchmahal custard apple (Annona squamosa), in Kachchh date (Phoenix sylvestris), in north Gujarat water melon (Citrullus lanatus) and potato (Solanum tuberosum) and in Saurashtra pomegranate (Punica granatum), guava (Psidium guajava), coconut (Cocos nucifera), lemon (Citrus limonia) and papaya (Carica papaya) are grown (Randhawa et al. 1968: 175-188).

Livestock

Animal rising is complementary and inseparable from agriculture in Gujarat. In the state, the livestock economy is governed by utilitarian considerations and religious sentiments (Randhawa et al. 1968: 194). Certain sections of the community such as the Rabaris, the Bharwads and Maldharis earn their income and subsistence from breeding or herding cattle, sheep, camel and buffalo. The profound nature of seasonality with dry and wet periods in Gujarat results in the movement of the pastoral communities along with their animals (Bhan 2004: 243-273). Popular cattle breeds of Gujarat are the Kankrej and Gir and buffaloes are Surati, Mehsani and Jaffrabadi (Randhawa et al. 1968: 197-200).
Palaeoenvironment

Till the beginning of 1990s, reconstruction of the Holocene environment of Pre and Protohistoric settlements in Western India including Gujarat were primarily based on the palaeoclimatic data recovered through geochemical and palynological studies of sediments from the Lunkaransar, Didwana, Sambar and Pushkar lakes in Rajasthan and the results showed few examples of significant variation in relative abundance of rainfall at different periods of Holocene (Ajithprasad 2004: 117-118). However, sediments from the Nal Sarovar bordering north Gujarat and Saurashtra regions of Gujarat, where southwest monsoon influences the climate was studied for the reconstruction of Palaeoclimate and it showed slight difference from that of the Rajasthan lakes (Sharma and Chauhan 1991: 65-71; Prasad et al. 1997: 153-159). The palaeoclimatic records for the period 6.6-4.8 ka from the the Nal Sarovar showed a shallow lake level, with periodic drying and short wet spells while lakes in Rajasthan showed higher annual rainfall. The Mesolithic and the early stages of Pre Urban Harappan period in Gujarat, especially in North Gujarat is dated to this time bracket (Ajithprasad 2004: 119). The data from Nal Sarovar showed a wetter climate than the present in the period between 4.8 ka and 3 ka. It is comparable to the Rajasthan precipitation data which indicated higher rainfall than the present (Prasad et al. 1997: 153-159). The Pre Urban Harappan and Urban Harappan periods in Gujarat coincided with this wet period (Ajithprasad 2004: 119). The end of the wet phase in Rajasthan lakes has been dated to about 3.5 ka to 4 ka, while data from the Nal Sarovar indicates the beginning of aridity about 3 ka and data from both the regions shows the commencement of present day conditions around 2 ka (Prasad et al. 1997: 153-159). Based on the data from phytolith, palynofacies, magnetic susceptibility and clay mineralogical studies from the Kothiyakhad sedimentary sequence of Mahi estuary in Mainland Gujarat, Prasad et al. (2007: 889-896) identifies considerable variation in the occurrence of monsoonal activity during 3660-2850 year BP. Palaeoclimatic records of Kothiyakhad, corresponds to the later phase of the weakening phase of SW monsoon that commented from
5500 year BP. During this period monsoon activity declined gradually and almost ceased around 3400 yr BP. Due to active western disturbances, during 3660-3400 yr BP, the winter precipitation was much more pronounced and extended large parts of western India, though this too declined ~3400 yr BP. This was the time the Indus Civilization declined drastically in this region (Prasad et al. 2007: 895). The SW monsoon regained its strength with a brief pulse of enhanced precipitation around 3320 BP along with minor subsequent fluctuations. Madella and Fuller (2005: 1283) based on Holocene climatic sequences and archaeology in South Asia, palaeoclimatic data from the lakes of Rajasthan, Palynology and vegetational change in Thar Desert and Indian Ocean monsoon and transoceanic correlations argued that “Harappan urbanism emerged on the face of a prolonged trend towards declining rainfall and no climatic event can be blamed for a precipitous end of this civilization, although strategic local shifts in agriculture that may have begun in response to prolonged droughts at ca 2200 BC may have contributed to the de-urbanisation process and the restructuring of human communities over the following 200-300 yrs.