CHAPTER 13

SUMMARY AND DISCUSSION

CHAPTER INTRODUCTION

The principal research objective of this study was to locate the geologic sources of the rock and mineral resources acquired by the ancient residents of Harappa. In Chapter 4, the site's entire stone and metal artifact assemblage was categorized into material varieties and then, using recent field observations and contemporary geologic reference materials (as opposed to century-old District Gazetteers), the most probable sources for the majority of them were outlined. Throughout the eight chapters that followed, selected varieties were directly compared to geologic samples collected from potential sources using a range of analytical methods. Over 2100 provenience determinations for artifacts from Harappa[1)] were generated as well as almost 120 for artifacts from other sites. In this chapter, these data are summarized and brought to bear on the three lines of inquiry outlined in Chapter 1. The implications of the answers to those inquiries are discussed in the concluding section.

SUMMARY

The results of this study are summarized in a series of maps on which symbols for identified and probable rock and mineral sources are plotted for each chronological period and sub-period at Harappa. When this is done, six detailed "pictures" (figures 13.2 through 13.7 corresponding to Harappa periods 1, 2, 3A, 3B, 3C and 4/5) emerge that approximate the extent of Harappan rock and mineral resource acquisition at different periods in time. Provenience data for artifacts from the other sites examined are

Figure 13.1 Key for figures 13.2 to 13.8.

1) Grindingstone (n = 1796), chert (n = 24), steatite (n = 141), agate (n = 24), vesuvianite-grossular (n = 7), limestone (n = 113), alabaster (n = 30), lead and copper (n = 36). *Total* = 2170.

summarized on Figure 13.8.

Figure 13.1 is the key for the maps. All rock and mineral varieties recovered from secure contexts at Harappa and the symbols representing them are listed. A symbol for silver, which appears only on the figure (13.8) detailing acquisition networks for other sites, was added to the key. On the maps themselves, resource acquisition is depicted with varying degrees of confidence. Solid lines from source symbols to sites denote acquisition networks based on firm provenience data. For example, the solid lines between the Rohri Hills chert source and Harappa drawn on the maps for periods 1 through 3B (figures 13.2 to 13.5) indicate that for each period at least one artifact was compared to samples from various chert sources and assigned to the Rohri Hills. Dashed lines depict networks that can still be reasonably inferred to have existed even though provenience data was not generated. For instance, although no tan-gray chert artifacts from Period 3C levels were analyzed, a dashed line was drawn from Harappa to the Rohri Hills for that period (Figure 13.6) based on the fact that identical looking artifacts from all previous periods were assigned to that source. The pathways of all network lines are, of course, conjectural. When possible, line thicknesses were varied in order to approximate differential source use among certain varieties (recall on p. 254 how this was done for steatite). Symbols plotted alone (without network lines) denote sources that are argued – based solely on factors such as the extent of the culture phase that Harappans belonged to and the overall acquisition pattern, to have *perhaps* been utilized during particular periods. All statements made in the summaries below are based on data and other evidence presented in previous chapters.

Ravi Phase – Period 1
(ca. 3300 BC to 2800 BC)

No fewer than 14 rock and mineral varieties were brought to Harappa during the Ravi Phase (Figure 13.2). Steatite was obtained from sources in two regions – Jammu and the northern Aravalli Range. Although some chert was acquired from the Rohri Hills of Sindh and the west-central Salt Range, at this time a purple-hued chert-chalcedony that *perhaps* originated in areas of trap rock in the eastern Salt Range and/or Kashmir was mainly used. The majority of the grindingstones recovered came from the relatively nearby Kirana Hills. Only small amounts of the stone used to make querns and mullers came from the much more distant Sulaiman Range, Himalayan Foothills (Siwaliks) or the outliers of the Aravalli Range in southern Haryana. The sole Ravi Phase galena fragment recovered was derived from one of the lead deposits in the Jammu and Kashmir region. The one vesuvianite-grossular artifact (a flake) found came from an occurrence in the Mohmand Agency. Because the only viable lapis lazuli sources for Harappans would have been the Badakhshan deposits of northern Afghanistan, it can be very confidently stated that all lapis lazuli artifacts recovered from this phase (and subsequent ones) came from that region.

Provenience analyses have not been conducted on any of the remaining rock and mineral varieties recovered from Period 1. It is, however, reasonable to assume that many of them came from the same regions to the north of the settlement that Ravi Phase Harappans acquired (and from which Harappans of later phases would continue to acquire) a large portion of their raw stone and metal. Alabaster from Period 1 levels was probably derived from the same sources in the Salt Range used during periods 2 and 3. Gold was likely obtained from the rivers draining the Himalayas, which were the nearest sources and no doubt then much richer. Amazonite and almandine garnet may have come from Himalayan pegmatites along with igneous/metamorphic rocks. Some rocks of the latter variety, as well as ochre minerals, probably also came from the much closer Kirana Hills.

Copper might have come from one of the minor

occurrences in the western Himalayas. However, they may also have been acquired from sources in other regions. The presence of steatite from the northern Aravalli Range opens the possibility that the rich copper resources of that region were accessible at this time. Additionally, some igneous and metamorphic rocks might have come from the Tosham Hills, which lie in the direction of the Aravallis. The presence of marine shell from the Arabian Sea coast during the Ravi Phase (Kenoyer and Meadow 2000: 67) suggests that the agate and, possibly, the amazonite sources of distant Gujarat may have also been accessible at this time.

Kot Diji Phase – Period 2
(2800 to 2600 BC)

Harappans acquired at least 14 varieties of rocks and minerals during the Kot Diji Phase (Figure 13.3). Steatite was now obtained exclusively from sources in regions to the north of the site – mainly from Jammu and the Hazara District of the NWFP but also from the Khyber and Kurram agencies. The majority of the chert used at this time still came from the west-central Salt Range. However, increasing amounts were being acquired from the Rohri Hills and some *may* have been brought from the Mohmand Agency. The use of purple-hued chert-chalcedony was diminishing. Most querns and mullers were still being made from Kirana Hills stone. There was a slight increase in the amount of Pab sandstone from the Sulaiman Range being used to make grindingstones but materials from the Himalayan Foothills and the Aravalli outliers were still only acquired in very minor amounts. Alabaster was derived from sources in both the central and western Salt Range. At least some agate was acquired from a source (Mardak Bet) in northern Gujarat.

The likely sources for the remaining Kot Diji Phase rock and mineral varieties are, with a few additions, mostly the same as they were during the Ravi Phase. The limestone that first appears in Harappa's assemblage at this time is an extremely commonplace type (brown micritic). It might have come from the Salt Range along with chert and alabaster-gypsum. Or it could be from the Sulaiman Range or Rohri Hills. The situation is the same for quartz and rock crystal artifacts. Those may have come from the Kirana Hills or they could be from sources further a field. The broader cultural horizons of the Kot Diji Phase would have made many resources in distant regions, such as the copper deposits of western Balochistan (Chagai Hills area), much more accessible to residents of Harappa.

Harappa Phase – Period 3A
(2600 to 2450 BC)

The twelve rock and mineral varieties recovered from the limited exposures of Period 3A levels (Figure 13.4) almost assuredly do not represent the full range of stone and metal resources acquired at that time. They do, nonetheless, provide evidence that some changes in acquisition patterns took place (or were taking place) around the time fully urban lifeways emerged at Harappa. The primary regional source of steatite was now (and would hereafter be) the Hazara District of the NWFP. Minor amounts of that stone were acquired from deposits in Jammu and the Khyber Agency as well as, for the first and only time, the Las Bela ophiolite of southern Balochistan. The serpentine artifacts that initially appear in Harappa's assemblage during this phase may have also come from the latter region or another with a similar geology (e.g., the Zhob, Muslimbagh or Mohmand area ophiolites). The Rohri Hills of Sindh appear to have been the sole chert source used by site residents at this time. Pab sandstone from the Sulaiman Range now slightly surpassed Kirana Hills stone as the most acquired type of raw material for making querns and mullers. There were also slight increases in the use of grindingstone from the Himalayan Foothills and northern Aravalli outliers. Agate (carnelian) was likely obtained from sources in Gujarat, just as it was in the periods that proceeded and followed this one.

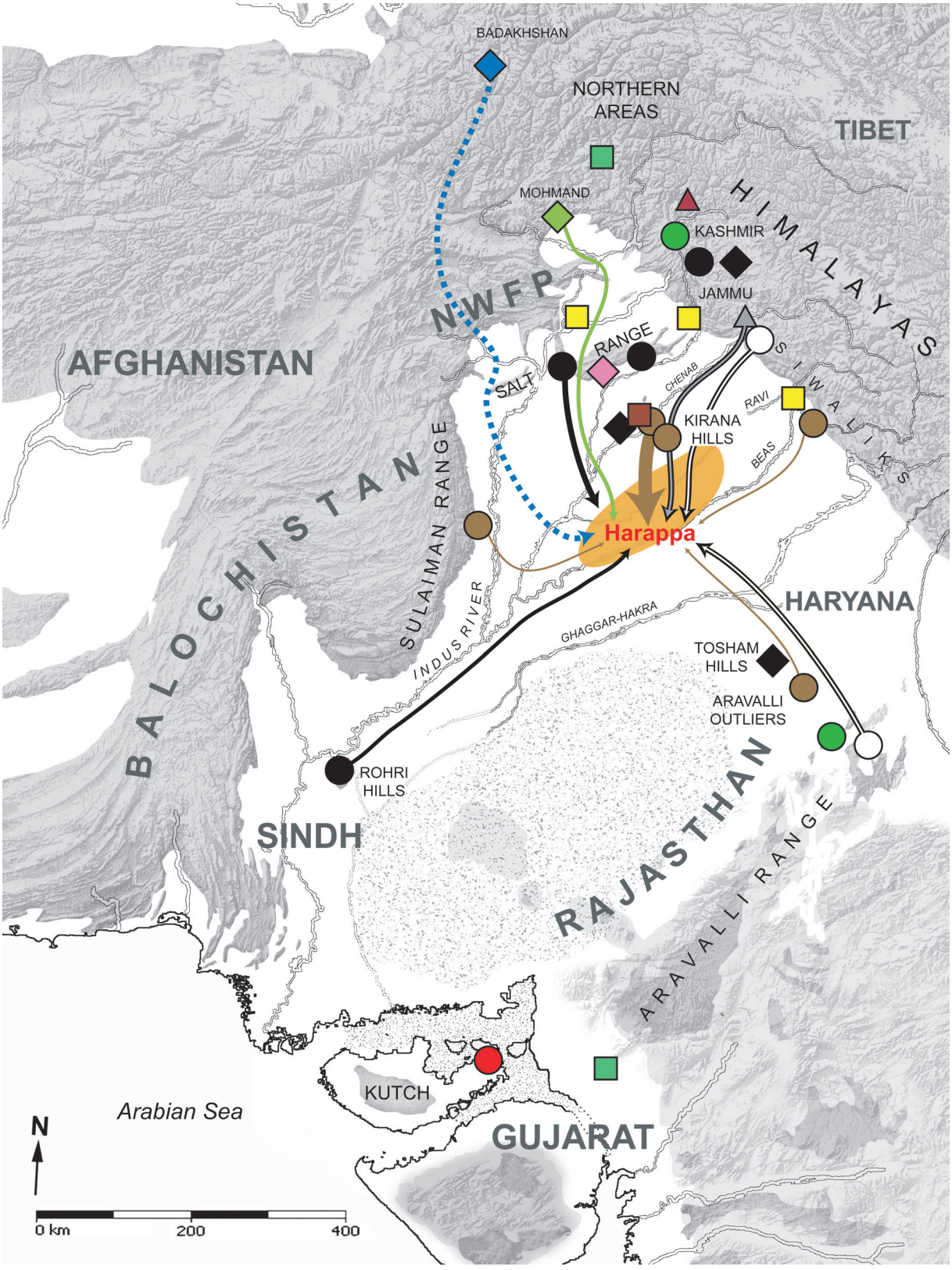

Figure 13.2 Harappa's rock and mineral sources and acquisition networks.

Period 1 –Ravi Phase (ca. 3300-2800 BC). Yellow shaded area indicates the approximate extent of the Ravi Phase.

The isotopic characteristics of some of the alabaster artifacts from this period (and from periods 3B and 3C) suggest that they *may* have come from unanalyzed sources in Jammu and Kashmir.

Harappa Phase – Period 3B (2450 to 2200 BC)

Harappans were acquiring at least 19 rock and mineral varieties by the middle part of the urban phase – Period 3B (Figure 13.5). The Haraza District was again the primary source for steatite but some was also brought from Jammu, the Khyber and Kurram agencies and the northern Aravalli Range. Although most of the chert used at Harappa still appears to be from the Rohri Hills, there are indications that some *may* have been obtained from the Mohmand Agency, NWFP. This is certainly possible as vesuvianite-grossular was also being acquired from a source in that region. The lead in a lead-based cosmetic from a Period 3B burial came from a source in Kashmir, perhaps in the Buniyar area. The use of Kirana Hills stone for querns and mullers practically ceased during this phase. Although the acquisition of stone from the Himalayan Foothills and northern Aravalli outliers increased slightly over the preceding period, the majority (nearly 70%) of grindingstone was still brought from the Sulaiman Range. Agate was being obtained from two sources in northern Gujarat – Khandek in western Kutch and Mardak Bet in the Little Rann. Some *may* have also come from same sources used by residents of Shahr-i-Sokhta, which would most likely have been in the Helmand region or western Balochistan.

The recovery of Mari "Diamonds" – the bi-pyramidal quartz crystals that occur within certain massive gypsum deposits of the Salt Range, from Period 3B levels indirectly suggests that alabaster from that region was being acquired at the time. "Ernestite" first appears in Harappa's assemblage during this period and, although no occurrences of the stone have yet been located, the fireclay beds of Kutch in northern Gujarat are among the best candidates for sources. Turquoise, which most likely came from western Tibet and/or Central Asia, also makes its first appearance at this time. Finally, if the distinctive spinach-green nephrite amulet from a Period 3B burial is quite likely from Siwalik conglomerate beds in the Kohat District, NWFP.

Harappa Phase – Period 3C (2200 to 1900 BC)

By the latter part of the urban phase – Period 3C, Harappans were acquiring 22 different rock and mineral varieties (Figure 13.6). The Haraza District, NWFP was once again the primary source for steatite. Small amounts were also being brought from deposits in the Khyber and Kurram agencies and the northern Aravalli Range but, for the first time, not from Jammu. Although Pab sandstone from the Sulaiman Range remained the most acquired type of grindingstone during Period 3C, its use decreased somewhat while there were increases in the amounts of raw material brought from the three other major sources. Vesuvianite-grossular was now obtained from sources in two regions – the Mohmand Agency and the southern Zhob District (Muslimbagh ophiolite) of Balochistan. Alabaster was derived from sources in the western Salt Range (along with Mari "Diamonds"), Kohat, multiple sources across the Loralai / Sulaiman Range area of northern Balochistan and, perhaps, Jammu and Kashmir. Harappans were acquiring lead from deposits in Jammu and Kashmir as well as from sources in the Las Bela and Khuzdar districts of southern Balochistan. Various types of limestone were obtained from northern Kutch, the Rohri Hills, the Jaisalmer area of Rajasthan and, probably, the Loralai area of Balochistan. Agate was being acquired from at least three sources across Gujarat – Khandek, Mardak Bet and, now, Ratanpur in the southern part of the state. Finally, a malachite fragment from this period appears to be related to the copper deposits of the northern

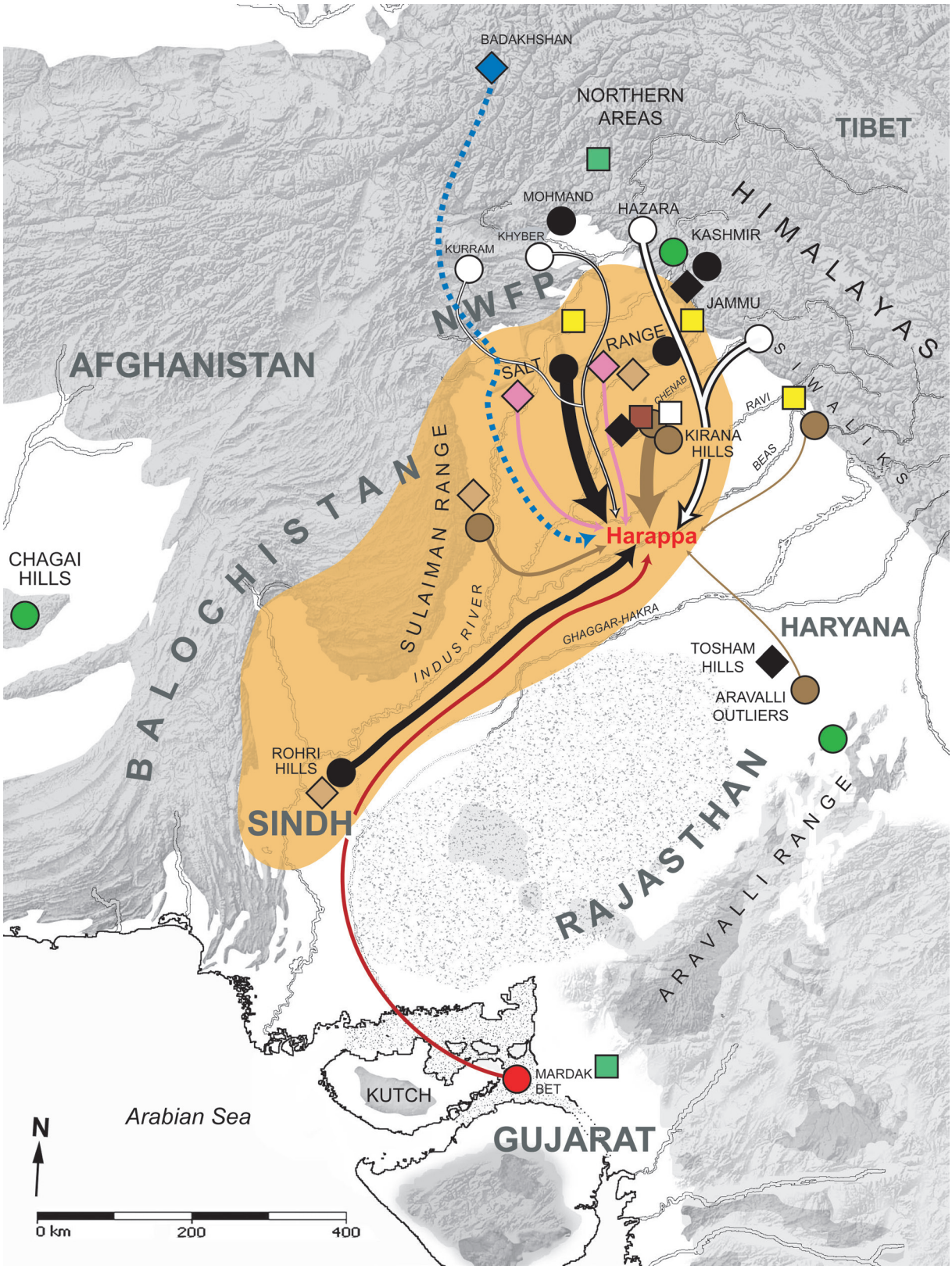

Figure 13.3 Harappa's rock and mineral sources and acquisition networks. Period 2 –Kot Diji Phase (ca. 2800-2600 BC). Yellow shaded area indicates the approximate extent of the Kot Diji Phase.

Aravalli Range.

Although no artifacts from this sub-phase were analyzed, most chert used during Period 3C was probably still acquired from the Rohri Hills. Of the new materials in the assemblage, prehnite likely came from the Las Bela or Muslimbagh ophiolites, fluorite from the Kalat District of Balochistan, mica from the Northern Areas and fossil foramina from the Sulaiman Range.

Transitional and Late Harappa Phase – Periods 4 & 5 (ca. 1900 to <1300 BC)

Only 12 rock and mineral varieties have been recovered during excavations of the poorly preserved transitional and Late Harappa Phase levels – periods 4/5 (Figure 13.7). They do, however, indicate that northern interaction networks persisted into Harappa's late/post-urban phase. Steatite was being acquired from the Hazara District and the Khyber Agency; vesuvianite-grossular was brought from the Mohmand Agency; and lapis lazuli from northern Afghanistan evidently remained obtainable. No analyses of agate or chert from periods 4/5 levels were conducted so it is impossible to say whether or not those materials were still being brought from Gujarat and Sindh (respectively). Both, however, could have come from regions to the north. Agate sources, although remote, do exist in the western Himalayas and there are indications from prior periods (2 & 3B) that chert from the Mohmand Agency was sometimes brought to the site. On the other hand, agate sources to the southeast, in the Malwa Plateau region, might been more accessible during this phase. The kaolinite claystone used to make a bead found in a cache from this period could have come from many regions but the strongest and nearest possibilities are found to the north of Harappa in the Salt Range and NWFP.

A strengthening of acquisition networks extending toward regions southeast of Harappa is indicated by the grindingstone assemblage of the Late Harappa Phase. Whereas Pab sandstone from the Sulaiman Range had dominated this material sub-assemblage throughout Period 3, fewer than 10% of the querns and mullers recovered from periods 4/5 levels are made from it. Delhi quartzite from the Aravalli Range outliers in southern Haryana had, for the first time, become the single most acquired type of grindingstone. The use of stone from the Kirana Hills was also up significantly over the preceding period.

Provenience data from other prehistoric sites – seventh to third millennium BC

Steatite, chert, grindingstone, agate, vesuvianite-grossular, alabaster, lead and silver artifacts from around two dozen additional sites were geochemically analyzed or visually examined for this study. The resulting provenience data provide a valuable supplementary perspective (Figure 13.8) with which to contextualize and interpret the results from Harappa.

Data from the analysis of steatite artifacts from seven sites were presented in this book. Observations and the preliminary results from ongoing studies at several additional sites were summarized. These studies have revealed both regional differences and similarities in the acquisition and use of this variety of stone. Residents of Neolithic to early Chalcolithic (ca. 7000 to 5000 BC) Mehrgarh used both dolomitic and ultramafic steatite from sources in Balochistan. Much later, peoples who lived at the nearby Harappan town of Nausharo acquired ultramafic steatite from the Las Bela area deposits of southern Balochistan. The distinctive appearance of an unfired bead from Balakot suggests that Harappans at that site were also exploiting locally (to them) available raw material from the Las Bela deposits. In Gujarat, the Harappans of Nagwada, Gola Dhoro and Dholavira utilized ultramafic steatite, which they obtained from sources in southernmost fringes of the Aravalli Range. Ultramafic steatite cannot be fired white, however. It was probably for this reason

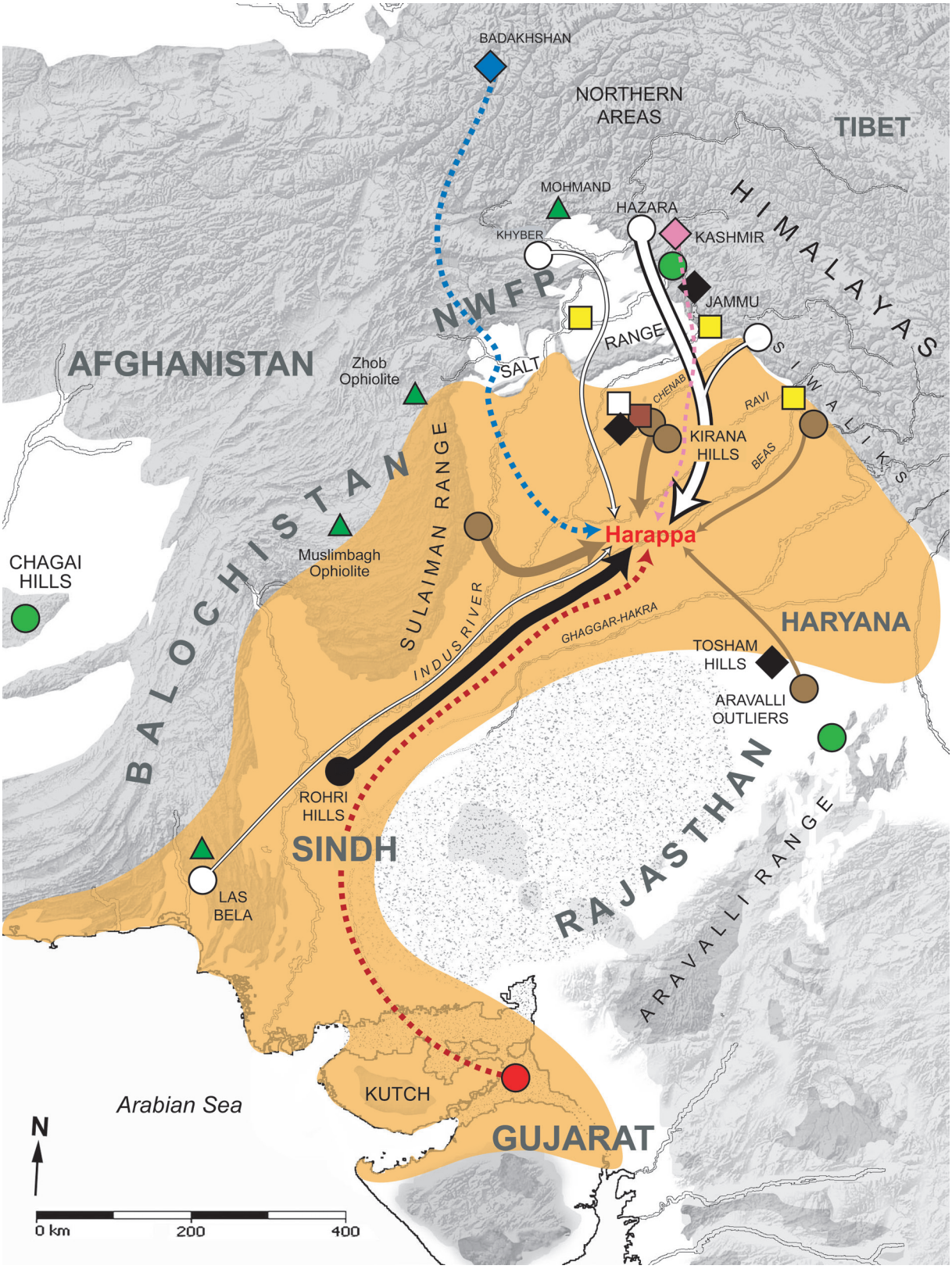

Figure 13.4 Harappa's rock and mineral sources and acquisition networks. Period 3A –Harappa Phase (ca. 2600-2450 BC). Yellow shaded area indicates the approximate extent of the Harappa Phase.

that consumers at the Indus cities of Mohenjo-daro, Dholavira, and Rakhigarhi mainly used white-firing dolomitic steatite from the very same northern sources favored by residents of Harappa. Alternate dolomitic sources were sometimes exploited. Steatite of this type from northern Rajasthan was used at Mitathal, Mohenjo-Daro and, to a minor degree, at Harappa. Interestingly, steatite artifacts from the site of Tepe Hissar in Iran were also found to be of dolomitic origin.

Much was learned about patterns of chert acquisition in ancient South Asia from the examination of museum collections and site surface observations. Early Harappans living at settlements in Bannu Basin and Gomal Plain were using radiolarian chert/jasper from the nearby of Zhob and Waziristan ophiolites that, although often colorful, was clearly not the same as the purple chert/chalcedony used by their contemporaries at Harappa. On the other hand, the black-brown chert from periods 1 and 2 levels at Harappa, which was determined to have originated in the Sakesar Formation of the Salt Range, was apparently also acquired by Early Harappans at Rehman Dheri on the Gomal Plain; at Musa Khel on the southern side of the Salt Range next to the source; and at Hathial on the northern margin of the Potwar Plateau. This regional black-brown chert distribution network evidently gave way (at least at Harappa) to the extra-regional distribution of tan-gray chert from the Rohri Hills of Sindh. The highly distinctive banded type of Rohri Hills chert was observed on the surface at and/or in excavation collections from each of the major Indus Civilization cities as well as smaller Harappan sites such as Allahdino and Chanhu-daro. Using INAA, tan-gray chert samples from Nagwada, Dholavira and Rakhigarhi have been analyzed and found, in most instances, to be closely related to geologic samples from the Rohri Hills.

Querns and mullers from a dozen Early Harappan and Indus Civilization sites were examined (in collections and on site surfaces) using the same macroscopic criteria that were employed to assign geologic proveniences to grindingstone artifacts at Harappa. These observations, although limited, are beginning to reveal the extents of the various regional bulk stone transportation networks to which residents of Harappa had access. We see that, as it was moved west toward Harappa, Delhi quartzite from the Aravalli Range outliers was dispersed to settlements like Mitathal, Siswal, Rakhigarhi, Banawali and Kalibangan. Like at Harappa, the gray sandstone observed at Banawali was probably brought from the Siwalik Foothills to the site via the waterways (in Banawali's case the Ghaggar River) draining that region. In the western Punjab, stone from the Kirana Hills was transported south beyond Harappa to sites along the lower reaches of the old Beas River bed. Pab sandstone from the Sulaiman Range was also observed at the Beas sites as well as to the south at Ganweriwala in Cholistan, to the north at Ghandi Umar Khan on the Gomal Plain and as far east at Rakhigarhi in Haryana. A great many (perhaps the majority) of the querns and mullers at Mohenjo-daro also appear to be made from Pab sandstone. Those, however, were most likely acquired from the continuation of the Pab Formation in southern Balochistan. Most of the grindingstones from Dholavira appear to be composed of locally or regionally sandstone.

Agate artifacts from Chalcolithic phase Mehrgarh and the Harappan Period sites of Nagwada, Dholavira, Chanhu-daro, Mohenjo-daro, Nausharo and Rakhigarhi have been compared to geologic samples from three agate sources in Gujarat and agate debris fragments from the proto-historic site of Shahr-i-Sokhta in Iran (which served as proxy samples for an Iranian agate source). As at Harappa, most of the artifacts resembled one of the Gujarat sources. A few from Mehrgarh and Nausharo did appear to be more closely related to the Shahr-i-Sokhta agates, which was not particularly surprising as those sites are located along the major transit way connecting the Indus Valley to highland Balochistan and, eventually,

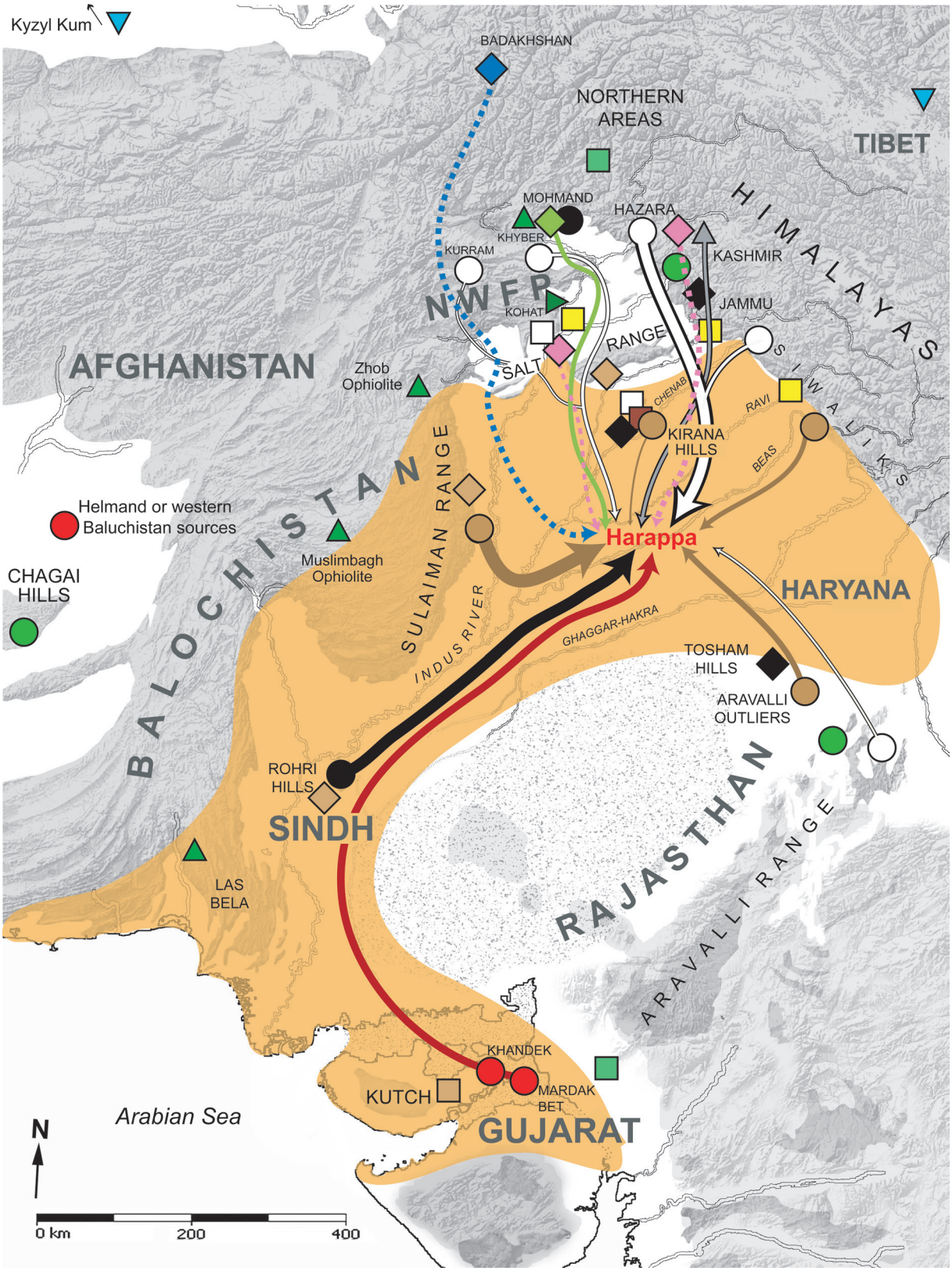

Figure 13.5 Harappa's rock and mineral sources and acquisition networks. Period 3B –Harappa Phase (ca. 2450-2200 BC). Yellow shaded area indicates the approximate extent of the Harappa Phase.

eastern Iran. Interestingly, two of the analyzed fragments from Chanhu-daro were also more closely related to the Iranian agates than to the Gujarati sources. Although they could be from Iran they may actually be from a poorly known agate occurrence in nearby Sindh Kohistan.

Vesuvianite-grossular fragments from Mohenjo-daro were determined to have originated in the same two source areas from which beadmakers at Harappa acquired that stone – the Sakhakot-Qila ophiolite in the Mohmand Agency and Muslimbagh ophiolite in northern Balochistan. Acquisition networks for finished vesuvianite-grossular items seem to have extended south to Gujarat, where ornaments made from the stone (but not manufacturing debris) have been identified at Dholavira and Lothal.

Alabaster fragments from the Kot Dijian / Late Kot Dijian Phase settlements of Rehman Dehri and Musa Khel were found, not surprisingly, to have been derived from nearby sources in the Salt Range. Both sites were, quite possibly, places where this variety of stone and other resources from the region (such as black-brown Sakesar chert) were gathered before being transported to Harappa. An alabaster vessel fragment from Mohenjo-daro could not be attributed to occurrences in the Salt Range or to any of the other sources examined. That item *may* represent an import from outside of the Greater Indus region.

Raw lead and/or lead metal from the deposits of southern Balochistan was traded widely. It has now been identified not only at Harappa in the Punjab but also at Mehrgarh and Nausharo in central Balochistan, Rakhigarhi in Haryana, Mohenjo-Daro in Sindh, and Dholavira and Gola Dhoro in Gujarat. There are indications that lead from these deposits was traded as far away as Ra's al-Hadd in Oman and Mundigak in southern Afghanistan. Residents of the latter site likely obtained some galena from nearby Asad Qala as well, although it is difficult to know with certainty until that and other lead deposits in Afghanistan are isotopically assayed. A handful of lead artifacts from Dholavira come from the Ambaji area of northeastern Gujarat while a few galena fragments from Mehrgarh appear to be from a source to the west, perhaps in the Chagai Hills region. Lead residue in a small bottle recovered from that site could not be attributed to any of the sources examined in this study, however.

To date, silver artifacts from seven sites have been assayed and compared to isotopic data from argentiferous lead deposits in the Greater Indus region and Iran. Nine of ten silver items from the Harappa Phase Allahdino jewelry hoard were found to be isotopically analogous to argentiferous lead deposits in the southern Balochistan region. A silver ring fragment from Early Harappan levels at Nagwada as well as multiple ornaments from Dholavira and Rakhigarhi were likewise found to have probably come from that same source area. All silver artifacts analyzed from Mohenjo-daro, as well as one from Allahdino, could not be confidently assigned to any of the deposits to which they were compared. These items *may* represent imports from outside of the Greater Indus region. A silver-lead ring from Gola Dhoro might well be from a source in eastern Arabia and although the lead in a silver ring from Mundigak is analogous to a deposit in northern Pakistan (Chitral), it is more likely to have come from an unassayed source in Afghanistan.

ADDRESSING THE THREE LINES OF INQUIRY

Informed by the synchronic "pictures" of Harappan rock and mineral acquisition presented in the preceding section, the three lines of inquiry pursued in this study are addressed one final time, beginning with: *With whom in the Greater Indus region or beyond were the residents of Harappa interacting, either directly or indirectly, when they acquired rock and mineral resources? What was the extent of those inter-regional relationships/resource*

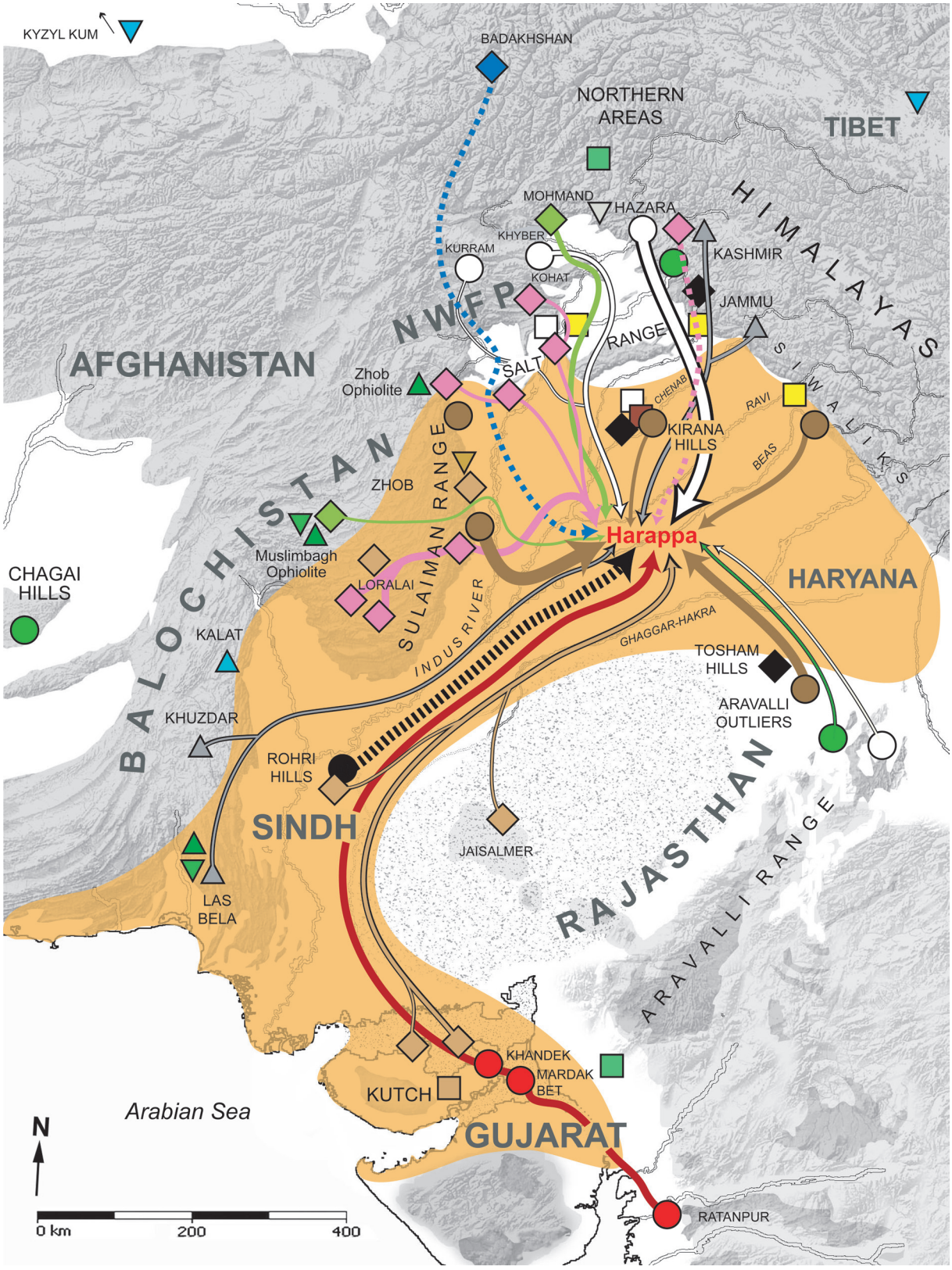

Figure 13.6 Harappa's rock and mineral sources and acquisition networks. Period 3C –Harappa Phase (ca. 2200-1900 BC). Yellow shaded area indicates the approximate extent of the Harappa Phase.

acquisition networks during different periods in time?

Rock and mineral artifact provenience determinations indicate that residents of Harappa "interacted" (recall the discussion of this term on pp. 24-25) with peoples in most every major region in and around the Indus Basin at one time or another. As those regions and the cultural phases associated with them are identified below, it may be helpful to refer back to the maps (Figure 2.6 A to D) and overviews (pp. 42-48) presented in Chapter 2.

In order to have acquired a substantial portion of the stone and metal items they possessed, Harappa's residents of all periods had to have been interacting with peoples that dwelled (either permanently or periodically) in regions to the north of their settlement. During periods 1 and 2, some of those northern peoples would have been other Early Harappans – other Ravi Phase peoples in the Rechna Doab; Tochi-Gomal Phase peoples in the Bannu Basin and Gomal Plain regions; and other Kot Dijians across all of those areas and up to the northern Potwar Plateau. Period 3 residents would have been interacting with "Late" Kot Dijians in those same areas as well other Harappans dwelling at least as far north as the Himalayan foothills, the southern flank of the Salt Range and the Gomal Plain. Beyond this the picture of interaction is less clear. Some degree of contact with Northern Neolithic peoples almost certainly took place during both the Early Harappan and Harappan periods when site residents acquired stone and metal from the Kurram, Khyber, Mohmand, Malakand, Hazara, Jammu and western Kashmir regions. Although Northern Neolithic sites have not yet been discovered in the immediate vicinity of the sources identified in those areas, they are found in the nearby Swat and Kashmir valleys as well as the northern Potwar Plateau. Rock and mineral provenience determinations indicate that residents of Harappa continued to interact with the proto-historic peoples in many of those same areas during the Late Harappan (Cemetery H) Phase. Lapis lazuli artifacts unequivocally demonstrate a link with northern Afghanistan during all periods at Harappa. Who might have been present at that acquisition network's point of origin (no doubt for only a short portion of the year given its extremely high elevation) is unknown, however.

Rocks and minerals determined to have come from sources in the Sulaiman Range and northern Balochistan reflect interaction between residents of Harappa and their fellow Early Harappans (Kot Dijians) and Harappans in regions to the west. Grindingstones from the Kaliana Hills of southern Haryana demonstrate links with Early Harappan (Sothi-Siswal Phase), Harappan and Late Harappan (Cemetery H) peoples to the east. Stone and metal goods and resources from Sindh, Gujarat and southern Balochistan point to interaction with other Early Harappans (Hakra Phase peoples from Cholistan to northern Sindh during Period 1 and Kot Dijians dwelling as far south as Sindh Kohistan and, perhaps, the northern Gujarat region during Period 2) and Harappans in the southern reaches of the Greater Indus region. Lead artifacts from the Khuzdar region suggest some degree of interaction with Kulli Phase peoples of southern Balochistan during Period 3C at Harappa.

Evidence for interaction between residents of Harappa and the ancient peoples of Rajasthan exists but is limited. The handful of steatite artifacts (p. 238) and the single copper ore fragment (p. 456) tentatively assigned to sources in the northern part of that state would seem to indicate that interaction with Malwa-Rajasthan Tradition peoples (Ganeshwar-Jodhpura Phase) took place during the Early Harappan and Harappan periods. Some limestone appears to have been brought to Harappa from the Jaisalmer area of Rajasthan during Period 3C. It is unknown, however, who inhabited that region at the time.

Before continuing it is important to again acknowledge that stone and metal artifact provenience

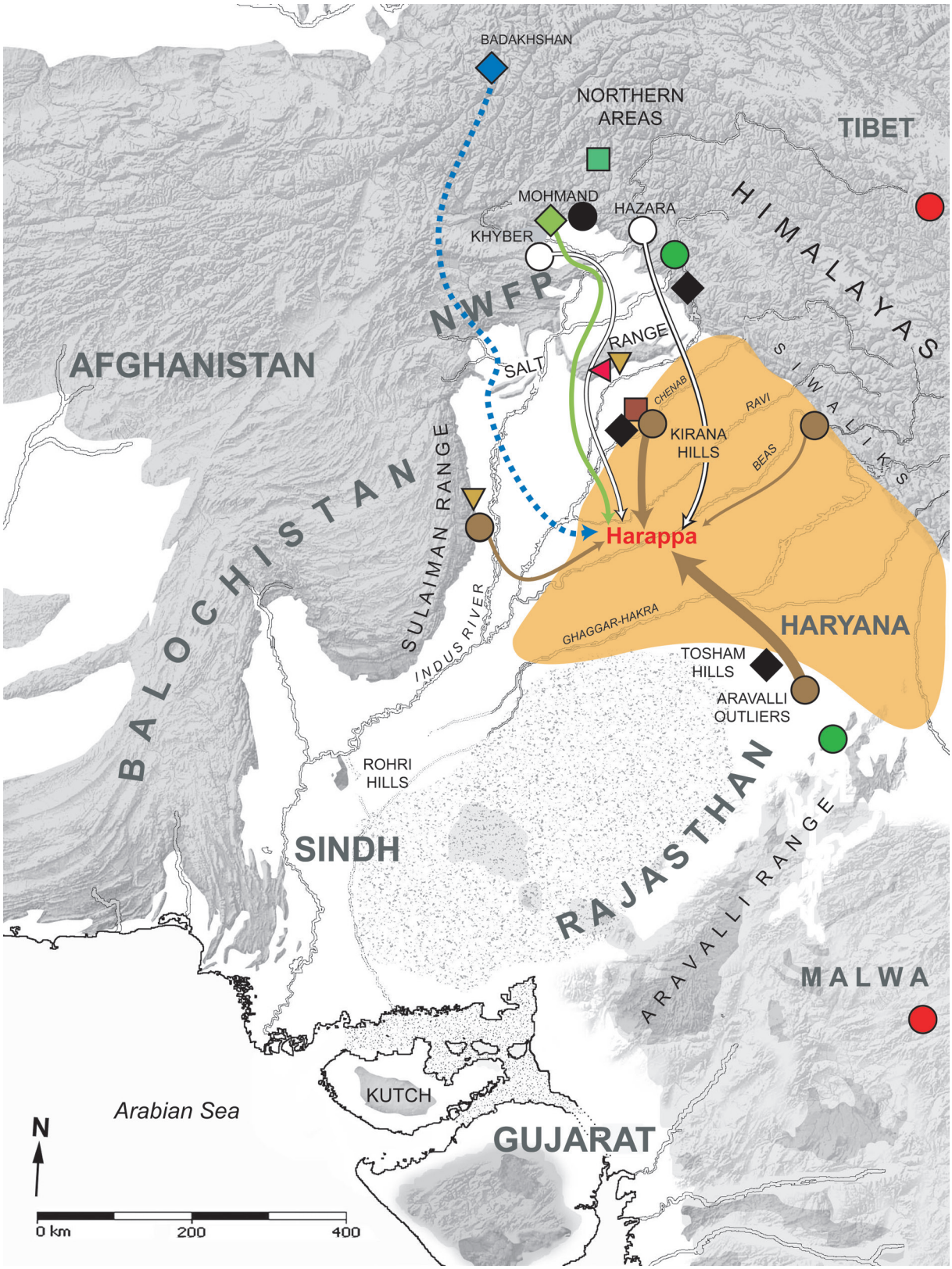

Figure 13.7 Harappa's rock and mineral sources and acquisition networks. Period 4/5 – Transitional & Late Harappa Phase (ca. 1900 to <1300 BC). Yellow shaded area indicates the approximate extent of the Cemetery H Phase.

data alone does not and can not capture the full scope of Harappan inter-regional relationships. Other lines of evidence – material (ceramic, shell, faunal, botanic), stylistic/iconographic and written (in contemporaneous Mesopotamia), indicate that Early Harappans and/or Harappans had connections with (and sometimes even dwelled in) distant regions from which it has not yet been demonstrated that rock and mineral goods or resources were being acquired. Some of these types of evidence are taken into account as I next consider the extent of inter-regional interaction/acquisition networks during different periods at Harappa and the degree to which they can be characterized as being external or internal to the successive cultural phases to which site residents belonged.

The presence of Rohri Hills chert and lapis lazuli in Period 1 levels shows that Ravi Phase residents of Harappa acquired stone from as far south as northern Sindh and as far north as northern Afghanistan. However, the marine shell also found in those levels (Kenoyer and Meadow 2000: 67) indicates that southern interaction networks for that phase actually extended to the Arabian Sea. Ravi Phase settlements are currently known only to exist along middle and lower reaches of the Ravi River in the western Punjab. Therefore, apart from those materials attributable to the Kirana Hills, all rocks and minerals acquired by Harappans during Period 1 would have come to the site through external trade networks.

Shaffer's statement (1982: 192) that "with the exception of turquoise and lapis lazuli" all raw materials used to make the objects found at Indus Civilization sites occur "within the distribution area of the Harappan culture in the Greater Indus Valley," is true. It is mostly true of the preceding Kot Diji Phase as well. This does not necessarily mean, however, that all stone and metal goods and resources (save for turquoise and lapis lazuli) acquired by periods 2 and 3 residents of Harappa actually came from occurrences within the areas that peoples of their respective phases occupied. For example, minor instances of copper mineralization are found sporadically across the Greater Indus region. The nearest to Harappa (noted as #4 on Figure 4.13 in Chapter 4) is located in the Salt Range (Shah 1980: 99). However, that instance and most others like it (including the small occurrence in Waziristan assayed in Chapter 12) exhibit no evidence of ever having been worked and could not have yielded a substantial amount of metal even they had been. The closest sources that could have provided Harappans copper in the quantities they used all occur in areas external to the Indus Civilization (i.e. western Balochistan, northern Rajasthan and Oman). A somewhat similar situation exists for steatite. Although occurrences of the stone are fairly widespread, sources of raw material having the qualities that Harappans sought (workability and turning white when heat-treated) are few and relatively far a field.

In order for Kot Dijian and Harappan phase peoples to have acquired certain stone and metal resources in the quantities they used and with the qualities they sought, it would have been necessary for them to have had access to sources outside of the areas (noted as the solid orange shaded areas on figures 13.3 through 13.6) across which they are presently known to have dwelled. That being said, most of the raw material sources that have been identified are located immediately adjacent to those areas. Some of them, such as the copper and steatite deposits of the northern Aravalli Range, lay in regions that were clearly occupied by non-Kot Dijian/Harappan peoples and so can be confidently characterized as external to those phases. However, the cultural associations of many others, especially those along the northern and western margins of the Greater Indus region, are much less clear. Most maps in this book were made in a style (with lines or shaded areas demarcating the approximate extents of cultural phases) that creates the somewhat misleading impression that the cultures depicted on them were

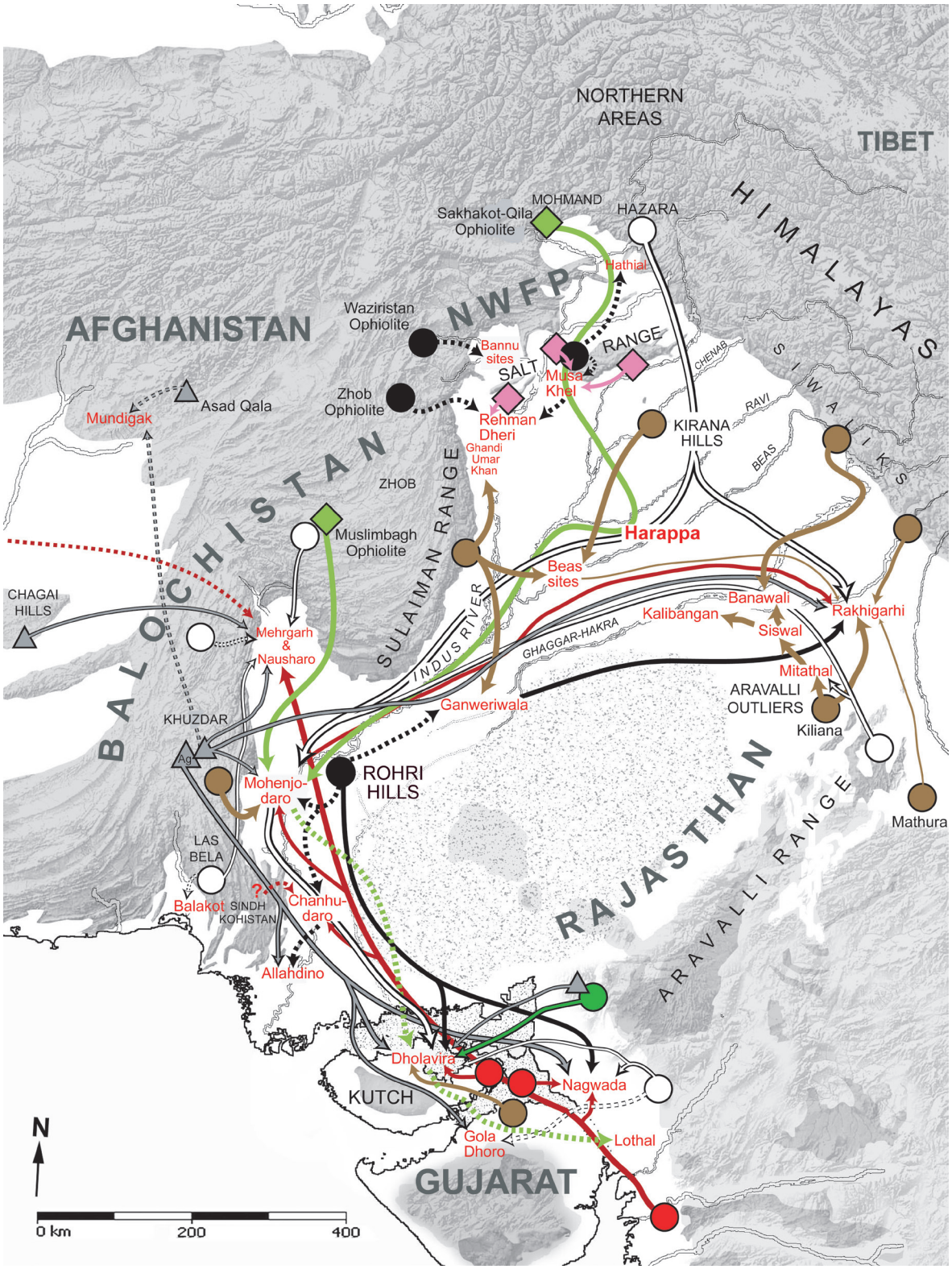

Figure 13.8 Rock & mineral acquisition networks for other prehistoric sites (ca. 7th to 3rd millennium BC).

homogenous and well-bounded entities (see Smith 2005 for a discussion of this problem). In reality, the frontiers of the Kot Dijian and Harappan phases were probably not as well-defined as they appear to be on the maps, at least not in all areas. Some of the raw material sources that are located just beyond the northern and western-most known limits of those phases (such as the steatite deposits of Jammu or the vesuvianite-grossular source in Zhob) might have actually been internal to them. Even if they were not,

most of the external rock and mineral acquisition networks that residents of Harappa were involved in do not seem to have extended very far beyond the regions across which peoples of the society they belonged to were primarily settled.

The latter finding is significant as there is a great deal of evidence demonstrating that Harappan interaction networks extended as far as Mesopotamia, the Arabian Peninsula, Iran and Central Asia (see discussion and citations on p. 47). At present, however, none of the artifacts analyzed for this study can be firmly attributed to geologic sources in any of those regions. A few lead artifacts and an alabaster fragment from Harappa, as well as a handful of items from other sites (an alabaster vessel fragment from Mohenjo-daro, some silver ornaments from that city and Allahdino, the silver-lead ring from Gola Dhoro and a few objects I have seen in the collection of stone and metal artifacts from Dholavira), do not appear to be analogous to any analyzed occurrences of those materials in the Greater Indus region. The Pb isotope characteristics of six copper ore fragments from Harappa suggest that they may have from sources to the west of the Indus Valley or, perhaps, Oman. A few agate artifacts from Harappa, Nausharo and Chanhu-daro are chemically more analogous to agate used at the site of Shahr-i-Sokhta in eastern Iran than they are to samples collected from sources in Gujarat. The BMAC-like wig from Harappa does seem to be made from a type of steatite not typically used by Harappans. However, none of these data, although very intriguing, conclusively demonstrate that those materials were being acquired from sources in the Near East, Arabia, Iran or Central Asia. As far as the present study of stone and metal goods is concerned, imports from those regions remain as "invisible" (Crawford 1973) as ever.

This does not mean that such imports will always remain invisible. As I remarked above, some of the data are intriguing, in particular those for copper and silver artifacts. If Indus Civilization peoples were going to acquire rock and mineral goods from distant regions it would probably have been valuable metals such as those rather than materials like steatite or chert. The work I have done for this study on copper and silver has been extremely limited in terms of both the number of artifacts and the potential sources analyzed. As the datasets for those materials grow in size and expand in scope, imports from sources outside of the Greater Indus region may become much more evident.

The full extent of rock and mineral acquisition networks during the Transitional and Late Harappan (Cemetery H) phases (periods 4 and 5) at Harappa is difficult to judge based on the limited assemblage that is available for study. It is, nonetheless, evident that materials like steatite and vesuvianite-grossular were still being acquired from sources to well to the north of the site. Although these sources were external to the primary region across which Cemetery H peoples are presently known to have lived, this status could change. Ceramic evidence suggests that those Late Harappans might have dwelled as far north as the Swat Valley (Stacul 1985). No agate artifacts from this period were analyzed and so it not possible is to confirm if that material acquisition network to Gujarat was still in place. However, the lack of marine shell from Cemetery H levels suggests that interaction with peoples that far south had probably ceased by this time (Kenoyer 2005).

In summary to this section: stone and metal artifact provenience data indicates that, at one time or another, residents of Harappa interacted with peoples in most every major region in and around the Indus Valley. Strong connections with groups in areas to the north evidently existed during all phases at the site. Interaction/acquisition networks with Haryana, Balochistan, Sindh and Gujarat varied depending on the period (these changes are discussed in more detail in the next section). Limited and somewhat tenuous evidence exists for long-distance contacts between site residents and the ancient peoples of

the Rajasthan region. Although Indus Civilization interaction networks are know to have extended as far as Iran, Mesopotamia, eastern Arabia and Central Asia, these connections are not, as of yet, clearly evident in terms of the geologic proveniences of stone or metal artifacts at Harappa. Although external rock and mineral acquisition networks can be said to have always been a feature at Harappa, with the exception of during Period 1, most of those networks do not appear to have extended too far beyond the area across which peoples of the cultural phase its residents belonged to at the time were primarily settled.

We now turn to the second line of inquiry: *How did the patterns of inter-regional interaction/resource acquisition exhibited by residents of Harappa change over time?*

Ravi Phase residents of Harappa were involved in interaction/acquisition networks that extended north to the Badakhshan region of Afghanistan, south to the Arabian Sea coast, west to the frontier of Balochistan and east to the southern Haryana/northern Rajasthan region. Over the next two millennia, some of those networks intensified or were augmented. Others diminished in intensity or were abandoned entirely. Still others appear to have remained constant throughout Harappa's long prehistoric sequence. In many ways, the evident diachronic patterns of rock and mineral acquisition correspond well with the generally understood and accepted sequence of inter-regional interaction during the emergence, existence and decline of urban lifeways in the Greater Indus region. Some patterns, however, may require us to reassess the significance of certain regions and the peoples that dwelled in them to the urbanization process.

No major changes are, at present, evident in the overall pattern of rock and mineral acquisition at Harappa between the Ravi (Period 1) and Kot Diji (Period 2) phases. This is despite the fact that the geographic scope of the latter society was considerably more extensive than that of the former. The use of steatite from sources in regions to the north of the site may have intensified somewhat by Period 2. Also, the Kot Diji Phase is the first in which agate from Gujarat and alabaster from the Salt Range has been positively identified at the site. Such patterns should be treated cautiously, however, as the sample from Period 1 levels is extremely limited (only two steatite fragments and no agate or alabaster artifacts from earlier Ravi Phase contexts were analyzed).

The most significant changes in raw material source usage at Harappa took place around the Kot Diji to Harappa Phase transition (Period 2 to Period 3A). At that time, the acquisition of various cherts from occurrences to the north of the site (black Sakesar chert from the Salt Range and purple-hued chert-chalcedony most likely from the Pir Panjal Traps of Jammu and Kashmir) seems to have completely (or nearly so) ceased and given way to the use of tan-gray chert from the Rohri Hills of Sindh to the south. Similarly, grindingstone acquisition networks shifted in emphasis from relatively nearby sources to the north of Harappa (Kirana Hills) toward more distant ones to the west (Sulaiman Range). Steatite from a source in southern Balochistan also appears at this time (Period 3A) and is perhaps indicative of a new Harappan presence (at Bakkar Buthi) in that region.

Acquisition networks toward the south, west and east intensified as the urban phase progressed. By Period 3C, limestone from Sindh, Balochistan, Kutch and, perhaps, the Jaisalmer region of far western Rajasthan was being brought to Harappa. Lead from southern Balochistan as well as vesuvianite-grossular and alabaster from sources in northern Balochistan were likewise being acquired by that time. Agates and, very likely, the "Ernestite" used for making drills to perforate them were being brought from Gujarat. The Kirana Hills to the north had been practically abandoned as a grindingstone source. Although most stone used for that purpose still came from the Sulaiman Range, sources in distant Haryana (Kaliana Hills) to the east were steadily growing in importance.

It is thought that, by Period 5, residents of Harappa had ceased to interact with other Late Harappan peoples in the southern reaches of the Greater Indus region (Kenoyer 2005). However, it is not currently possible to support or refute this hypothesis with provenience data. No examples of the two materials that would most likely provide information on the matter – chert and agate, were analyzed from the site's limited Late Harappan levels. There is evidence from the grindingstone sub-assemblage that may be indicative of what is seen (Possehl 1997c) as an eastward demographic movement of Cemetery H Phase peoples during that period. The use of Pab sandstone from sources to the west appears to have fallen precipitously over Period 3C. Most grindingstone used during periods 4/5 was being brought from the Kaliana Hills, which are located around 400 km southeast of Harappa.

In contrast to the interaction/acquisition networks between Harappa and the southern, western and eastern parts of the Greater Indus region, which intensified and/or diminished over time, those extending toward the northern reaches of present-day Pakistan, India and Afghanistan appear to have remained fairly constant throughout the site's entire prehistoric sequence. Steatite, which has been analyzed for every period and shown to have mainly come from northern sources, and lapis lazuli, which is present in every phase, are the best indicators of this. Although chert from the Salt Range stopped being acquired after Period 2, alabaster from those mountains continued to be exploited during Period 3. Provenience data indicates that lead, vesuvianite and, perhaps, even small amounts of tan-gray chert were also acquired from northern sources during the urban phase at Harappa. Lapis lazuli, vesuvianite and steatite from the north demonstrate that interaction with the peoples of that region continued uninterrupted into the late/post-urban phase.

The diachronic perspective adopted for this line of inquiry permitted several ancillary issues related to changes in the use and/or acquisition of stone and metal goods at Harappa to be examined. When the composition of the site's rock and mineral assemblage was compared from period to period, it became evident that even though the geographic scope the Harappans' society changed significantly over time, the basic suite of raw materials they used remained, more or less, the same. While there are some variations between assemblages of different phases, most can be attributed to the lower probability of recovering less abundant varieties in less extensively excavated levels (recall Figure 4.12 and the discussion on p. 99). The likely exceptions are for vesuvianite-grossular, "Ernestite," and limestone. Each of these materials seems to have been primarily (or exclusively in the case of "Ernestite") acquired and used during the latter portion of the urban phase (ca. late Period 3B and Period 3C). The coincident appearance of the first two was quite probably related. Beadmakers at Harappa simply could not have perforated vesuvianite-grossular until "Ernestite" was discovered or its source otherwise became accessible. I consider the former to be more likely the case as the results of the agate provenience study (Chapter 8) indicate that raw materials from Gujarat – the region from which "Ernestite" most likely came, were accessible to site craftsmen from at least Period 2 onwards. Limestone, on the other hand, was abundant in almost every part of the Greater Indus region to which Harappans of any period had access. I have argued (pp. 616-617) that its use to create bulk-sized, non-utilitarian objects during the late urban phase probably represents a new development in the way that Harappans (not just at Harappa but also at Mohenjo-daro) expressed social power through the consumption and display of stone.

The diachronic perspective revealed that acquisition patterns for certain utilitarian stone goods at Harappa change significantly over time. It is clear that the Ravi Phase founders of the settlement already participated in extensive (described above) inter-regional interaction networks. The stones they

acquired through the more far reaching ones were ornamental materials like lapis lazuli and steatite. Utilitarian goods – namely grindingstone and chert, were primarily obtained from the closest occurrences, which contained material of marginal quality. This remained the case during the subsequent Kot Diji Phase, although use of higher quality materials from more distant regions did increase somewhat. With the onset of the fully urban phase (Period 3), the closest sources entirely (or nearly so) ceased to be exploited. This trend toward the acquisition of higher quality utilitarian stone from remote occurrences was probably due, in part, to the expanding geographic scope of the Harappans' society as well as the development/improvement of technologies (wheeled carts and watercraft) necessary to transport goods in bulk sizes and quantities over long distances. With regard to chert from the Rohri Hills of Sindh, which appears to have not only been the primary type used by residents of Harappa during the Integration Era but also by Indus Civilization peoples across northwestern South Asia, the trend is probably also indicative of an utilitarian material becoming a widely used symbol of group identity and a key item of exchange in the extra-regional economy. Ratnagar suggested (2001a: 354) that the distribution of Rohri chert was a "process handled by the rulers" of Indus society. While I agree (with qualifications – see p. 480), Smith has shown (1999) that long-distance trade networks for "ordinary domestic goods" had, at times, flourished in premodern South Asia without a "centralized government to provide economic infrastructure" (ibid.: 110).

In summary to this section: when the composition of Harappa's rock and mineral artifact assemblage and the geologic proveniences of select items analyzed/examined from it are regarded diachronically, we see that the inter-regional acquisition/interaction and material usage patterns of its residents in some ways changed and in other ways remained steady over the period of time that urban lifeways emerged in northwestern South Asia. During Period 1, acquisition networks already extended to the limits of the Greater Indus region even though the cultural phase that site residents then belonged to was confined to the western Punjab Plain. The strongest connections, which were with regions to the north of the settlement, seem to have continued uninterrupted (although not unchanged) from this time through Period 5 (Late Harappa Phase). As the different regional Early Harappan phases coalesced into the multi-regional the Indus Civilization, the Harappans' acquisition networks toward the south, west and east intensified and, in areas like Balochistan, expanded. The most significant changes in raw material source usage occurred around the Kot Diji to Harappa Phase transition (ca. Period 2 to Period 3A). At that time, the primary chert acquisition network shifted from the north to the south and grindingstone acquisition patterns expanded beyond the nearest occurrences toward much more distant sources of higher quality stone. The basic suit of raw material types used at the site remained more or less the same from the Early Harappa through the Harappa Phase, however. It was not until late in the urban phase (ca. Period 3C) that site residents began to acquire (at least on a large scale) varieties of stone like vesuvianite-grossular, "Ernestite" and limestone. During the post-urban Late Harappa Phase, inter-regional acquisition networks extending toward the east intensified while those to the south and west diminished or ceased.

The third line and final of inquiry asked: *Did synchronic variations in the patterns of rock and mineral resource acquisition and use exist between groups of people living in different habitation areas at Harappa?*

Synchronic assessments of Harappa's rock and mineral artifacts assemblage revealed mainly similarities but also a few notable differences between its mounded areas. Few significant variations in the geologic proveniences of stone and metal artifacts from different mounds were observed. During periods 3B and 3C, the residents of mounds E/ET

seem to have been the only Harappans utilizing alabaster from and "unknown" source, which I believe to likely be located somewhere in Jammu and Kashmir or the NWFP. Other than that, it would appear that, during all periods, Harappans living and working in different parts of the site had access to and were acquiring raw materials and/or finished goods derived from the same geologic sources. Slight variations in source proportions were sometimes evident between mound sub-assemblages, however. The inhabitants of mounds E and ET always seem to have used more Pab sandstone from the Sulaiman Range than their contemporaries dwelling on mounds AB and F. During Period 3C, the people of Mound F appear to have used at least twice as much Delhi quartzite from southern Haryana as those in other areas of Harappa. They also may have utilized steatite from northern Rajasthan more than other site residents during that same period. While this might indicate that Harappans dwelling in these parts of the site had stronger trade connections with the peoples of those distant regions, such patterns should be treated with caution. Many of the apparent variations could be due to recovery bias (see p. 99) as fewer trenches were excavated on mounds AB and F as compared to mounds E and ET.

The synchronic distribution patterns of rock and mineral artifacts at Harappa suggest that, during each period, people dwelling/working within the site's four main walled areas (mounds AB, F, E and ET) were using (and presumably had more or less equal access to) the same basic suite of raw materials. Most variations, where they are evident, are likely due to the low probability of recovering less abundant material varieties on all mounds. The only genuine exceptions are for "Ernestite" and vesuvianite-grossular (see the argument presented in Appendix 9.9), which seem to have been mainly used on mounds E and ET during periods 3B and 3C. Without "Ernestite" Harappans could not have perforated a stone as hard as vesuvianite-grossular. Kenoyer has suggested (1997b: 272) that its acquisition and use was a "closely guarded trade secret."

Other than the two varieties of stone just discussed, there is little synchronic variation of material use (or provenience) within the rock and mineral assemblage that might indicate different groups, whose "centers of power" (Kenoyer 1997a: 69) were Harappa's walled mounds, controlled access to specific material types. Of course, a raw material, such as steatite from the Hazara source, might have first been acquired by the residents of one mound and then distributed to consumers on the others. However, such an activity, if it occurred, cannot be detected using the methods employed in this study.

The few genuine synchronic variations within Harappa's rock and mineral assemblage are very informative, particularly with regard to the relationship between the adjoining mounds E and ET. In addition to being the primary locations where "Ernestite" and vesuvianite-grossular were used, the two mounds exhibit grindingstone acquisition patterns that are practically mirror-images of one another. The production/use of alabaster bangles to seems to have been exclusive to these two areas as well. These patterns of material use and production suggest that the inhabitants mounds E and ET were closely related and lend support the view (Kenoyer 1998: 55) that latter was an outgrowth or "suburb" that grew from and was incorporated into the former during Period 3B.

DISCUSSION

Now that all of the provenience determinations have been brought to bear on the three lines of inquiry, some implications of what has been learned can be discussed.

The development and nature of Harappan rock and mineral acquisition networks

As far back as the Neolithic Period at Mehrgarh (ca. 7000 BC), Indus Tradition peoples were obtaining ornaments made of materials from extremely remote sources. Eventually, peoples there and at other Early Harappan Period settlements in the Greater Indus region began acquiring those materials in raw form and transforming them into items would have served to enhance the wealth, status and power of those who owned and controlled them. From this, Raymond and Bridget Allchin observed (1982: 107), and others later concurred (Kenoyer 1998: 38; Possehl 1999: 680), that the "trade in luxury goods, often over long distances, had already been established for thousands of years before the beginning of Indus urbanism." The results of this study confirm that long-distance acquisition networks for prestige-related rock and mineral goods and resources were indeed already in existence at the time of Harappa's founding. Their establishment did not, for the most part, either immediately precede or accompany the incipient-urban (Kot Diji) or fully urban (Harappa) phases at that site. Instead there seems to have been a steady intensification and augmentation of existing inter-regional networks during the millennium or so leading up to emergence of the Indus Civilization at around 2600 BC. Long-distance trade, therefore, should not be regarded as a new (or even particularly uncommon) phenomenon that alone prompted the socio-political developments that led to urbanism in northwestern South Asia. Rather, long-distance trade networks were ancient and intrinsic features of Indus Tradition societies whose existence facilitated the urbanization of the region and which themselves underwent significant changes during that process.

One of the most significant changes was the trend toward the acquisition of two types of utilitarian stone – chert and grindingstone, through long-distance trade networks. Generally in pre-modern societies, goods of this nature tended to circulate in exchange networks that were much more localized as compared to those for prestige-related resources and products (Hirth 1992). Of course, at Harappa and at most other Harappan settlements located on plains of the Indus Valley proper, utilitarian stone acquisition networks were necessarily broad to begin with. In her model of the scales of trade in Early Historic Period India, Monica Smith defined (2002: 140) *local trade* as an activity that could be undertaken in a single day by the fastest means of conveyance available. In this regard, there were no local trade networks for any kind of stone or metal at Harappa simply because there were no local sources. There was only *regional trade* (that taking place within the territory of a single cultural unit of a size that required those transporting something to spend a period of time away from their place of residence) and *long-distance trade* (which takes place across expanses that encompass multiple cultural phases and/or and ecological zones) (ibid.). The extent of grindingstone and chert acquisition networks, even though broad to begin with, expanded significantly – from regional to long-distance, as urban lifeways emerged at Harappa and in the Greater Indus region. I have argued that this was due, in part, to the development/improvement of the wheeled carts and watercraft needed to transport goods in bulk sizes and quantities. However, another important contributing factor would have been the expansion over time of the system of internal trade networks through which residents of Harappa acquired stone.

Rock and mineral artifacts deriving from external sources – i.e., those located outside of the geographic area encompassed by settlements of the cultural phase to which residents of Harappa belonged, have been recovered from every chronological period and sub-period at the site. It can be stated, therefore, that external trade was continuous feature of Indus society, at least at Harappa itself. It was most pronounced during Period 1 when, as far as we presently know, Ravi Phase peoples were settled only in the western Punjab. However, from that time through the

Harappa Phase, the system of internal acquisition networks to which Harappa's residents had access steadily expanded as the geographic scope of the society that they were a part of became larger and sources previously accessible only through external networks were encompassed into it. During Period 2, that system stretched from the Potwar Plateau to Sindh Kohistan. By Period 3, site residents could have acquired rocks and minerals from Haryana and large parts of Balochistan and Gujarat through internal trade networks. Although there would have been instances where entirely new internal networks were established as Early Harappan and/or Harappan peoples moved into new areas, the development process is best characterized as expansion through integration. That is, the vast internal system of the Indus Civilization was largely built upon various existing regional systems that were joined during the Integration Era.

Significantly, all but a few of the identified and probable rock and mineral sources that appear to have been external to the Indus system during the Integration Era are located in regions that were immediately adjacent to it. Moreover, the situation along those "peripheries" is often far from clear. Many of the sources lying just beyond the area where Harappan sites are found might well have been within the Indus system (recall the discussion on p. 235). Whatever the case actually was, the results of this study indicate that, as far as rocks and minerals are concerned, the vast majority of external trade that residents of Harappa were engaged in involved interaction with peoples along the highland margins of the Greater Indus region. It is, of course, well-documented that Indus Civilization peoples had contacts with and sometimes even dwelled in regions far beyond this (see p. 47). However, like Shaffer (1982: 200) and Chakrabarti (1990: 169), I found little evidence to support the views of researchers (Asthana 1978; Possehl 1990; Ratnagar 2004) who feel that long-distance trade with the ancient peoples of western Asia, in particular Mesopotamia, "may have played a significant role in ... the development of Indus urbanization" (Possehl 1990: 276-277). It is true that the artifacts analyzed for this study were not compared to any sources in western Asia and that there were a small number that could not be firmly attributed occurrences in the Greater Indus region. Nevertheless, at this point I have to concur with Lahiri's assessment (1990: 441) that while at times "there may have been raw materials involved in the long-distance trade between the Indus Valley, the Persian Gulf, Iran and Mesopotamia there is no reason to argue that Harappa or any other site of the Indus Civilization were in any way solely or even significantly dependent on such raw materials." Harappans would have found multiple occurrences of practically every rock and mineral resource they required in abundance within or directly adjacent to the Greater Indus region.

Although I interpret the evidence presented in this book as providing little support for the supposition that long-distance trade with western Asia significantly influenced the development of urban lifeways in the Greater Indus region, this does not diminish the fact that such trade indeed took place or the possibility that it may have been vitally important to *some* groups within Harappan society. That no firm evidence for those trade relationships was detected in this study of Harappa's rock and mineral artifact assemblage probably has a lot to do with the types of materials examined (see p. 477) as well as the geographic location of the site itself (this latter point is discussed in more detail below). However, when such evidence is detected at Harappa or at another Indus Civilization site (as I am confident it eventually will be) it must be put into perspective.

Kenoyer is probably correct in his assertion (1991a: 361) that "external trade was a critical factor to the internal controls that maintained the Indus structure." Controlling access to and managing the distribution of goods or raw materials from outside

of the Greater Indus region would have been an important strategy for some elite groups in Harappan society who were competing (for wealth, power and prestige) with other groups that controlled different sources or kinds of essential resources. We may be certain that those Harappans whose relationships in Arabia, Iran or Mesopotamia enabled them to import goods or raw materials from those distant regions into the Indus system benefited greatly by doing so. It is possible that there where some groups (families, guilds, merchant castes, etc.) whose livelihoods were based largely or even entirely upon their network ties with regions external to the Harappan homeland. However, those networks were only one aspect of what we are now beginning to realize was a vast, multi-regional and multi-tiered acquisition system that was primarily centered on raw materials that were usually available in multiple locations across northwestern South Asia. Ultimately, as Shaffer once remarked (1982: 191), "the evidence indicates that Harappan external trade with the West cannot be compared to that which existed between contemporary Mesopotamia and the Iranian Plateau or Persian Gulf, in terms of intensity, regularity or relative importance to cultural developments in these regions."

Competition and the control of essential resources

The extensive inter-regional trade system discussed above, in combination with the wide distribution and multiple occurrences of essential resources across northwestern South Asia, is argued (Kenoyer 2000: 89-90) to have been a critical stimulus for economic competition and socio-political development in the ancient Indus Valley. That is, this unique setting is seen as having presented early village communities and, eventually, different groups of city-dwellers with wide-ranging opportunities to vie with one another for wealth, power and social-standing by controlling raw material sources and/or access to material acquisition networks. It was, in essence, an optimal cultural and geographic environment for the promotion and maintenance of the social and political stratification characteristic of an urbanized society like the Indus Civilization.

In this book, I have attempted to shed light on competition and the control of essential goods and resources at Harappa by conducting phase-by-phase synchronic assessments of the material variety and provenience composition the site's rock and mineral artifact assemblage. Although some striking differences that can be construed as evidence for these behaviors were detected between different mounds, on the whole, the results were equivocal. Part of the trouble no doubt had to do with the sample. For all chronological phases, only a small, non-representative fraction of the site's mounds has been excavated. The methodology used is clearly better suited to a site where multiple large-scale horizontal excavations have taken place. Perhaps the biggest problem was the likelihood that even though many rock and mineral varieties might have been initially acquired by Harappans dwelling on one mound, they were subsequently dispersed to residents in other parts of the site, thus muting the inter-mound patterns of material control that I had hoped to detect.

The results of the site-wise synchronic assessments of material usage and provenience at Harappa have already been summarized above. In my estimation, the only usage patterns that are likely to be genuinely indicative of control of resources and competition between groups at the site are those for vesuvianite-grossular garnet and "Ernestite" – both of which are found mainly (≈ 90% of all artifacts in each variety) on mounds E and ET during periods 3B and 3C. I have examined these patterns at length (pp. 318-324 and Appendix 9.9) and explained how "Ernestite" was the only drilling material that Harappans possessed that could have been used to perforate a stone as hard as vesuvianite-grossular. I would argue that the distribution at the site of artifacts composed of

these two materials is directly related to "Ernestite" being, as Kenoyer has suggested (1997b: 272), a "closely guarded [*controlled*] trade secret." Only those craftspeople on mounds E and ET who were working with drills made from this stone could have fashioned vibrant green vesuvianite-grossular beads. This would have translated into a *competitive* advantage for elites in that part of the site who controlled the production of status-defining items. The distinctive Harappan-style long-barrel carnelian bead is also an item that only those who controlled access to "Ernestite" drills could have had manufactured. I have not undertaken a study of the locations at Harappa where such beads were made but if production was found to have been centered on mounds E and ET then that would provide excellent supporting evidence for the pattern of material control that I have argued existed.

The remaining material distribution patterns indicate that, by and large, people living in all parts of Harappa were using the same kinds of rocks and minerals. Similarly, when the provenience patterns for individual material types were examined synchronically, it became clear that, barring a few variations in source proportions that are of arguable meaning (see p. 235), all site residents had access to and were using materials derived from the same geologic occurrences. These patterns in no way rule out the possibility that there were certain groups at Harappa who had network ties that enabled them to alone control the importation of rocks and minerals from specific regions or sources. The problem (for me in terms of this study) is that restricting all imported materials to their own parts of the site would not, in most cases ("Ernestite" excepted), have been of much benefit to such groups. They could have garnered far more economic, social and politic power in the course of transferring (bartering, selling, gifting, providing as tribute or tax) their surplus resources to Harappans living in other areas of the site. Detecting group control of specific materials and material sources in the archaeological record of the site is, for this reason, problematic.

Even though intra-site exchanges have obscured inter-mound patterns, it is still possible to infer something about competition and the control of rock and mineral resources at Harappa by looking at the overall provenience results. Kenoyer argued (1995b: 221-222) that the existence of multiple potential sources for most raw material varieties used by Indus Civilization peoples "must have presented a unique opportunity for competition between merchants and suppliers and a major problem for elites trying to control access to potentially high status materials." For each of the eight rock and mineral varieties from Harappa that were examined in detail, I was able to confirm that, during most periods, site residents utilized raw material from geologic occurrences located in two or more different regions. This likely indicates that multiple groups were involved in the supply of these material varieties. That is say, it seems unlikely that, for example, a group involved in transporting a material like Pab sandstone from sources over 200 km west of Harappa in the Sulaiman Range would be the very same group that supplied Delhi quartzite to the site from a source nearly 400 km to the east. Although the exact nature of any competition between various suppliers is difficult to speculate about at this time, it is now quite evident that consumers at Harappa would have had multiple choices for many or most of the raw materials that they wished to acquire. This situation would indeed have proved problematic for elites trying to control access to certain types of prestige-related rocks and minerals.

Finally, I interpret the dramatic shift in chert source utilization that occurs at the beginning of Period 3A as likely being the result of a group of Harappans monopolizing the market for that utilitarian stone. Recall (p. 144) that Ravi and Kot Diji Phase residents of Harappa were acquiring this material variety from no less than three different sources. By the Harappa Phase, however, chert from

the Rohri Hills of Sindh was almost[2] exclusively used there and, apparently, at other Harappan settlements throughout the Greater Indus region. There were probably a variety of reasons why, even though many alternate sources would have been accessible to Indus Civilization peoples, this particular material type was utilized so extensively. To begin with, it was simply the best quality chert available. The large nodules of homogenous material occurring in the Rohri Hills permitted standardized long blades to be produced on an "extraordinary scale" (Biagi and Cremaschi 1991: 97). There were possibly aesthetic and/or symbolic reasons as well. The black-brown and colorful variegated cherts and jaspers that were popular materials for making stone tools in the Early Harappan Period might have fallen out favor. Something about the light-tan/gray homogenous and concentric banded types of Rohri Hills chert may have appealed to the Harappans' sense of purity and order. The highly distinct appearance and consistent density of the banded type are probably the main reasons why it was the most commonly used raw material for making Harappan-style standardized cubical weights. Weights with this appearance could not be replicated (i.e. faked) in any other type of stone.

Ratnagar has argued (2001a: 354) that the pan-regional distribution of Rohri Hills chert type reflects a "process handled by the rulers" of Indus society. Although I agree, I am not inclined to conceptualize those rulers as having been leaders of a single, politically unified extra-regional state (Ratnagar 1991: 169). Given the size and restricted geographic setting of the Rohri Hills within the Indus Valley, they could conceivably have been controlled by one community of Harappans based in northern Sindh that oversaw the extraction and monopolized the distribution of the valuable utilitarian resource there. I see that community as having been one of the many elite factions (merchants, landowners, ritual specialists, etc.) who, it is argued (Kenoyer 1994a: 77), were competing with one another for political dominance in Indus cities. If one judges by the apparent ubiquity of this particular material type at settlements large and small across the Greater Indus region, then it is reasonable to conclude that these Harappan "chert barons" (who may have also had interests in other industries and areas) were exceptionally successful in that regard. Underlying their success were the factors that made their product widely desirable (discussed in the preceding paragraph), the technologies (wheeled carts and watercraft) that enabled them to transport it in large quantities over long distances and, importantly, the location of the Rohri Hills themselves in the geographic center of the Indus Basin along or near what would have been the principal north-south Harappan interaction/trade network.

Harappan inter-cultural relationships

One of the stated aims (p. 11) of this study was to identify and evaluate the significance of Harappan inter-cultural relationships by studying the trade of essential raw materials. The peoples that residents of Harappa were interacting with, either directly or indirectly, when acquiring rock and mineral resources have now been identified (the results were summarized on pp. 474-476). During the Regionalization Era, some of those peoples were members of same cultural phase to which site residents belonged and some were part of different Early Harappan phases that would eventually come to be incorporated into the Indus Civilization during the Integration Era. There were others, however, which belonged to non-Early Harappan cultural phases. Later, during the Integration Era, site residents were interacting with fellow Harappans as well as various non-Indus Civilization peoples in highland areas

2) There are indications that cherts from sources in regions other than the Rohri Hills were utilized to a very limited extent at Harappa (Chapter 5) and Mohenjo-Daro (Kenoyer 1984a: 119) during the Harappan Period.

adjacent to the Greater Indus region. In this section, I discuss the significance of these non-Early Harappan and non-Indus inter-cultural relationships.

Judging by rock and mineral acquisition patterns, the most important and enduring inter-cultural relationships for residents of Harappa were those with groups dwelling in regions north of the upper Indus Basin. Specifically, these would have been with Northern Neolithic Phase peoples – the highland agro-pastoralists found across the Swat, northern Potwar and Kashmir regions from the Early Harappan through the Harappan periods – and peoples of the "Late" Kot Diji Phase in the Potwar, Bannu and Gomal regions during the Harappan Period. With regard to the latter phase, Raymond Allchin advanced (1984: 53) three theories as to why it persisted in the north while Kot Dijian peoples in the south, including those at Harappa, were integrated into the Indus Civilization. The first was environmental. The intensive agriculture that Harappans practiced in the Indus Valley proper, Allchin argued, may not have been suited to the climate or irrigation regime of the north. Although this is not my area of expertise, it is my feeling that these were probably not inhibiting factors as agriculturalists had thrived in the Bannu and Gomal regions from the Sheri Khan Tarakai Phase (ca. 5th and 4th millennia BC) onwards. If Early Harappans could sustain settlements in the north then it is likely that Harappans could have also. Allchin's second theory was economic. The north, he hypothesized, may not have "offered raw materials which were in demand in the Indus heartland" (ibid.). This was plainly not the case as I have demonstrated repeatedly throughout this book. In fact, we now know the opposite to have been true. The third theory was political. Allchin speculated that there may have been an "active opposition" by "Late" Kot Dijians in the north to Harappan control over the region (ibid.). This is conceivable, although it should be noted that there is no evidence whatsoever for violent confrontations between those two societies.

Although rock and mineral artifact provenience data demonstrate that residents of Harappa interacted with peoples to the north of the site that belonged to cultural phases other than their own, they provide little information as to the nature of those relationships. It may be helpful, therefore, to briefly consider the results in terms of the same three or four basic interaction scenarios that were discussed earlier (p. 235) in regard to steatite acquisition networks.

One possible scenario is that Early Harappans (Ravi Phase peoples and Kot Dijians) and Harappans never directly encountered peoples of the northern highland regions where many of the identified rock and mineral sources are located. Instead, members of another cultural phase(s) acted as an intermediary between them. This scenario is unlikely to have been true during the Early Harappan Period. Firstly, there is no indication that any other cultural phases were then present in the north who might have acted as intermediaries. Secondly, Kot Dijian settlements are found up to the northern edge of the Potwar Plateau. Thus, during Period 2 at Harappa, site residents could conceivably have acquired raw materials from fellow (at that time) Kot Dijians who dwelled in the north and made forays directly (without intermediaries) into adjacent (for them) source areas occupied by Northern Neolithic peoples. During Period 3 at Harappa, however, the "Late" Kot Dijian peoples living along the northern periphery of the Greater Indus region may themselves have sometimes served as intermediaries between Northern Neolithic peoples and Harappans to the south. In fact, some of the Kot Dijian materials reported at Northern Neolithic sites might actually be from this time period. For example, among the local Neolithic materials at Ghalegay rock shelter in Swat, Stacul described (1987: 39-40) ceramics comparable to those at "sites displaying the late Kot Dijian style" in levels that produced a calibrated radiocarbon date of 2180 BC (ca. early Period 3C at Harappa).

Another possibility is that Northern Neolithic

and/or "Late" Kot Dijian peoples sometimes traveled southward to Harappan settlements on the Punjab Plain, carrying with them raw materials for trade that they obtained from sources in their home territories. This scenario is most applicable to peoples of the former cultural phase who, by the mid-to-late third millennium BC, were reportedly raising domesticated sheep, goat and cattle at highland settlements like Gufkral in the Kashmir Valley (Sharma 1983a, 1983b). The seasonal migration regimes of herders and their flocks are the foundation of the ancient and still continuing "symbiotic relationships" between highland and lowland peoples all along "western borderlands" of the Indus Valley (Fairservis 1975: 233; Possehl 1999: 14-15). Shaffer argued (1978: 153) that because their wide-ranging transhumant lifeways afforded them "knowledge of points of consumption, as well as possible sources of supply," those pastoralists would have been the primary procurers and conveyers of raw materials from prehistoric Balochistan. Northern Neolithic herders, like historical Himalayan pastoralists such as the Gaddis and Gujars (Drew 1875: 107-111), might have performed a similar role in the "northern borderlands" of the Greater Indus region. The vast stretches of grazing land that were available in the bar uplands of the western Punjab doabs (Possehl 1984) would certainly have been an impetus for them to migrate southward to that region during the winter months. The Northern Neolithic sites that Possehl reported (1999: 548) in the Thal Desert tract (the Indus-Jhelum doab) near Leiah might even be the remains of their seasonal camps. Still, no such sites have been identified anyway in the vicinity of Harappa and no artifacts (ceramics, stone tools, etc.) that would provide an unambiguous association with that cultural phase have even been recovered there.

A seemingly more likely scenario would be one involving Northern Neolithic and "Late" Kot Dijian peoples coming into contact with Harappans in the highland-lowland transition zone where those cultural phases met. Evidence for inter-cultural interaction between these phases at Early Harappan and Harappan settlements excavated along that zone is limited[3], however. That is to say, material culture belonging to non-Harappan phases is not as evident at them as it is at, for example, sites along the southern Indus frontier in Gujarat like Nagwada (Hegde *et al*. 1988) and Gola Dhoro (Bhan *et al*. 2004). Certainly nothing resembling an enclave of Northern Neolithic or "Late" Kot Diji Phase peoples dwelling at a Harappan settlement (or vice-versa) has ever been discovered along the northern highland-lowland transition zone. In some places, peoples of different phases do seem to have dwelled in close proximity to one another. For example, on the Gomal Plain, the small Harappan site of Hisham Dehri (Dani 1971: 31) is located just 500 meters north-northeast of the larger Kot Dijian site of Rehman Dehri. Two radiocarbon samples taken from sealed floor levels in latter site's third and final occupational phase (RHD III) provided calibrated dates of 2170 BC and 2090 BC (Thomas and Allchin 1971: 39-40), which indicates that it was occupied well into the Harappan Period. It is, therefore, highly likely that the "Late" Kot Dijians of Rehman Dehri and the Harappans of Hisham Dehri were contemporaries living within sight of one another[4]. Currently, we can only speculate about the nature of the relationship between the peoples of those settlements. However, there is little evidence to suggest that it was hostile[5]. Whatever the situation actually was, it is clear that

3) A single burial at Ropar and some ceramics at Chandigarh (Ropar and Chandigarh are Harappan sites located in the extreme eastern part of the highland-lowland transition zone under discussion – see Figure 2.5) exhibit Northern Neolithic parallels (Possehl 1999: 552). A few Northern Neolithic ceramic forms continue in very limited numbers into mid-Kot Diji Phase levels (Period II) at Sarai Khola (Mughal 1972: 37).

4) The same situation may have existed to the southwest at the sites of Maru I and Maru II (Khan *et al*. 2000).

while "Late" Kot Dijians on the Gomal Plain and elsewhere somehow resisted social integration with Indus Civilization peoples, this did not impede Harappan acquisition of raw materials from beyond the northern frontier of the Greater Indus region.

Harappans themselves may have sometimes traveled beyond the northern frontier and interacted directly with peoples dwelling in rock and mineral source areas. Of all the basic scenarios reviewed here, this is the one we can be most confident actually occurred. The reason is because of the existence of the Indus Civilization site of Shortughaï. Harappans obviously had to have made the journey to northern Afghanistan at least once in order to found that settlement. It is probably be safe to assume that they traveled there and returned multiple times. Figure 13.9 is a map depicting the major routes leading from the upper Indus Basin to Shortughaï. It is recognized that there are numerous other pathways that Harappans might have taken[6] and that just because a particular one (such as the Khyber Pass) is famous in the modern era does necessarily mean that it was important in the past. However, those depicted here became the best known and most utilized historically mainly because they were among the most expedient. Even owing for changing landforms in this tectonically active region, it is highly likely that they would have been during the prehistoric period as well. In addition to the possible routes, identified and probable Harappan Period rock and mineral sources are plotted on the map along with pertinent Indus Civilization, "Late" Kot Dijian and Northern Neolithic sites.

In Appendix 13.1, I evaluate the different routes depicted on Figure 13.9 in detail. Although Indus Civilization peoples may have journeyed to Shortughaï along any of them, I have concluded that the evidence most favors a route that first passed through either the Potwar Plateau / Peshawar Valley regions or the Gomal Plain. That no Harappan sites (or non-Harappan sites with evidence Harappan contacts) have yet been discovered in the former regions does not greatly diminish this assertion as there are large parts of northern Pakistan that remain to be systematically surveyed. Three decades ago, Possehl remarked (1979: 545-546) upon the apparent paucity of Indus Civilization settlements in the western Punjab. Since then, surveys in that region (some of which remain incomplete) have revealed the existence of a number of such sites (recall the discussion on pp. 39-40). Alternately, over two decades of intensive work by the Bannu Archaeological Project (Khan *et al*. 2002b) has failed to detect any Harappan presence in that region, which is one of the reasons why I consider it unlikely to have been an important pathway to Shortughaï. The results of this study suggests that there may be Harappan sites yet to be discovered across the Potwar Plateau and in the Peshawar Valley; probably in the large unsurveyed areas and/or beneath the numerous Historic Period settlements that exist in both regions.

Harappans journeying to Shortughaï by a route passing through the Potwar Plateau and Peshawar Valley would have encountered "Late" Kot Dijians and, probably (certainly if they were continuing north via the Swat Valley), Northern Neolithic Phase peoples too. Who they might have interacted with in regions beyond this is unclear. The cultural landscape of late

5) Bridget Allchin's theory (1982: 237) that Hisham Dehri was the camp of a "Harappan army" laying siege to Rehman Dehri does not hold up well under scrutiny – i.e., terracotta "cakes," which are found in abundance at Hisham Dheri, were probably not weapons (projectiles) and there is no other evidence for violent conflict. Xu's interpretation (1990) that Kot Dijians and Harappans had an "antagonistic" relationship is based largely on the existence of a "burnt" layer at the site of Kot Diji that may not have actually been the result of conflict.

6) For instance, in addition to the primary Kurram and the Tochi river routes, there are 32 minor passes from the Bannu Basin through the Waziristan Hills alone (Thomas and Knox 1994: 93).

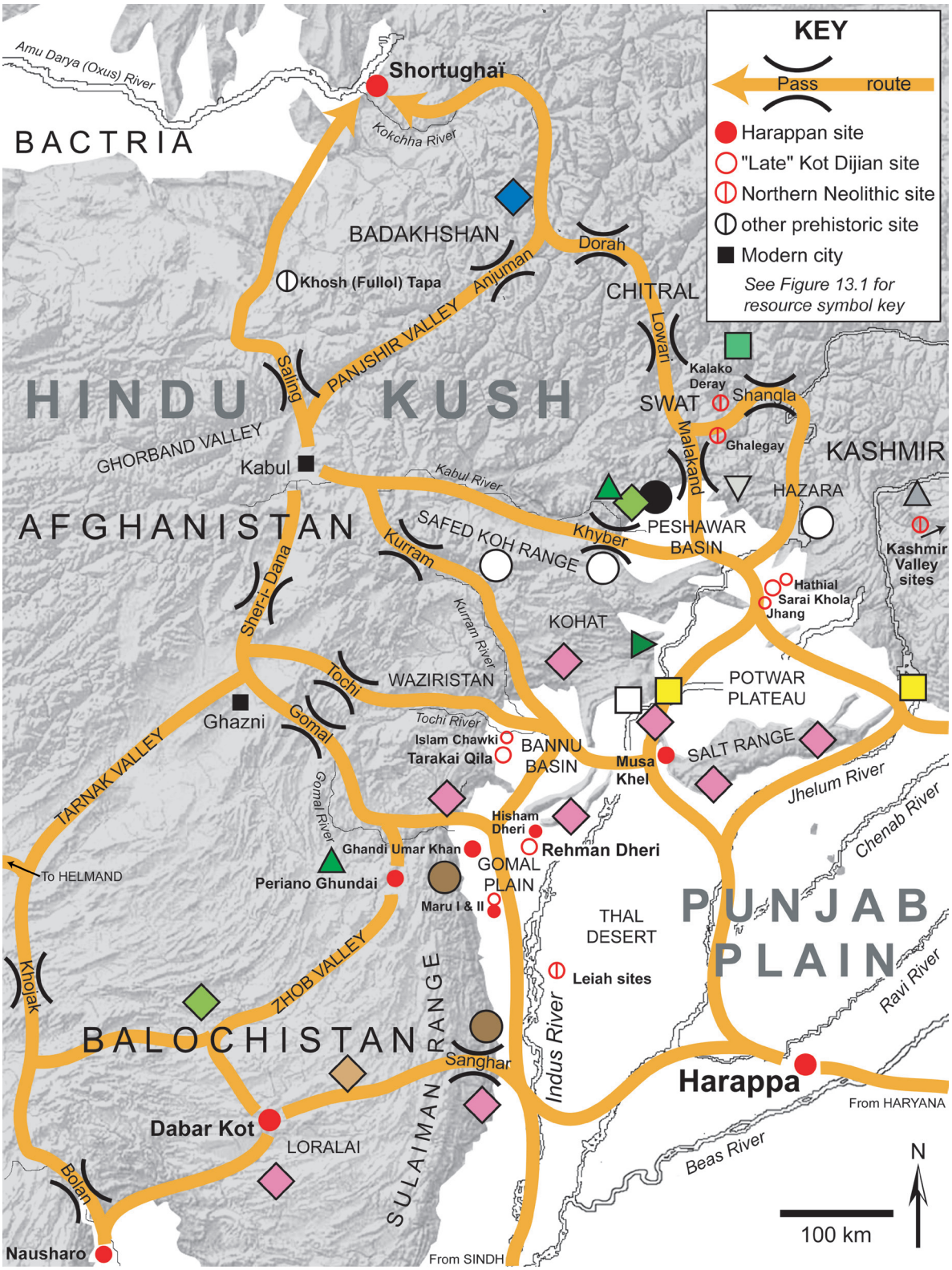

Figure 13.9 Major routes from the upper Indus Basin to the Harappan site of Shortughaï.

prehistoric northeastern Afghanistan is still largely *terra incognita*. What little evidence exists indicates that it was a region where peoples from distant lands dwelled alongside indigenous Chalcolithic phases (Lyonnet 1977, 1981). The fragmentary gold and silver vessels that were recovered from a hoard at Khosh (Fullol) Tapa and dated to ca. 2600-1700 BC had stylistic parallels linking them to both the Helmand region and Mesopotamia (Maxwell-Hyslop 1982; Tosi and Warwick 1972). Valuable resources, especially

lapis lazuli but also precious metals, were no doubt what impelled peoples from those distant lands to make the arduous journey to northern Afghanistan. Future research may eventually show that this region, like eastern Arabia, was one of the places where Harappans closely intermingled with multiple cultures from across Middle Asia.

Although it is difficult, at present, to say much about the nature and dynamics of Harappan relationships with non-Indus Civilization peoples in the north, they were clearly integral to the development and maintenance of urban lifeways at Harappa and, by extension, in the Greater Indus region. That having been said, these were not the only inter-cultural relationships detected in this study of Harappa's rock and mineral assemblage. There are indications (reviewed on p. 474) that site residents also interacted with non-Indus Civilization peoples dwelling in northern Rajasthan, southern Balochistan and southern Gujarat when acquiring certain varieties of stone and metal. That evidence, however, is far less abundant and far less varied than it is for the north. In some instances it is rather tenuous as well. Still, it would be a mistake to interpret it as suggesting that inter-cultural relationships with the non-Indus Civilization peoples of those regions were not also integral to the overall urbanization process in ancient northwestern South Asia. They may have been less important to the residents of Harappa than others, but Harappa was only one settlement (albeit a major one) in the vast Indus realm. Its residents were well-situated geographically to have and benefit from relations with peoples in the north. It stands to reason that the inter-cultural relationships of Harappans dwelling in Indus Civilization cities located in other regions may have been very different indeed.

The primary rock and mineral resource catchment areas of Indus cities

One of the main accomplishments of this study has been to provide a new and detailed picture of the extent and direction of Harappa's rock and mineral catchment area. In this final discussion section, I use that understanding to model the catchment areas and acquisition/exchange patterns that might be associated with the other major Indus cities. I then briefly consider some of the undetected acquisition networks at Harappa from multi-regional perspective the model offers. I begin by reviewing Harappa's catchment area.

Harappa's primary rock and mineral catchment area

In Chapter 4, I discussed how, in simple terms of distance to the nearest potential sources of the rocks and minerals recovered at the site, Harappa is oriented toward the highlands west and north of the upper Indus Basin (recall p. 101 and Figure 4.13). Of course, this is not particularly surprising if one just studies a good map. Geographically, Harappa is the Indus Civilization city located nearest to the Subcontinent's northwestern highlands and, thus, it was to be expected that many resources used at the site may come from that region. In fact, scholars like Fentress (1976), Ratnagar (1982) and Lahiri (1990) predicted this. In chapters five through twelve, I was able to confirm that a large portion of the stone and metal artifacts analyzed indeed were derived from sources within a broad, semi-circular zone that began directly west of Harappa in the Sulaiman Range and extended through to the highlands north-northeast of the site in Jammu. There were some significant exceptions – such as chert from the Rohri Hills of Sindh and agate from Gujarat. Harappa's full rock and mineral catchment area was extra-regional and extended from at least northern Afghanistan to Gujarat, perhaps much farther. Even so, I would argue that it is appropriate to characterize it as being *primarily* oriented toward the northwestern highland zone described above. I have highlighted this zone (primary catchment area) on Figure 13.10 using orange-shaded terrain. Broad arrows represent the general movement of raw materials

from the highlands toward Harappa (and not any one acquisition network).

Because of Harappa's location in the upper Indus Basin and its resident's now demonstrated acquisition/interaction links with the highland zone discussed above, I am not averse to informally labeling the site as the Indus Civilization's "gateway to the north." However, I expressly do not think it appropriate to characterize it using the formal geographic concept of "gateway settlement" (Burghardt 1971) as Ratnagar attempted to do in her article *The Location of Harappa* (1982). She hypothesized that the site was a lower-level tributary city on the Indus periphery that functioned as a "gateway" through which commodities from external sources flowed toward a primate city in the core, specifically, Mohenjo-daro. Because of this, it was thought that "transportation functions and facilities would outweigh the importance of manufacturing" at Harappa (Ratnagar 1982: 163). Ratnagar's hypothesis does not hold up under scrutiny but, to be fair, our understanding of settlement patterns in the Punjab, manufacturing activities at Harappa and the movement of goods and resources in the Greater Indus region has grown considerably since her article was published over a quarter-century ago. It is now understood that Harappa was not an isolated settlement on the northern Indus periphery (recall pp. 37-40) and that a huge and highly varied amount of craft manufacture took place there (Kenoyer and Miller 2007). Most importantly, we now know that, although the site's rock and mineral resource catchment area was largely oriented toward the northwestern highland zone, its residents had access to and were importing raw materials from all parts the Indus realm and, in some instances, beyond. Thus, Harappa was not merely a settlement through which commodities flowed from the hinterlands to the Indus core. It was a regional center of craft industries and trade as well as a nexus of inter-regional trade routes (Kenoyer 1995, Lahiri 1990).

Although Harappa was not a gateway city, there are indications that its residents were exporting some of the rocks and minerals they acquired from northern sources to consumers in other parts of the Indus realm. Most of the steatite artifacts analyzed to date from Mohenjo-daro, Rakhigarhi and Dholavira appear to be from the same northern occurrences (in the Hazara District, NWFP and the Kurram Agency, FATA) as the majority of those analyzed from Harappa. Likewise, most the vesuvianite-grossular fragments analyzed from Mohenjo-daro appear to be from the Sakhakot-Qila ophiolite on the northwest edge of the Peshawar Valley, just as were most from Harappa. While such provenience patterns obviously do not prove that these or any other raw materials from the northwest highland zone were transported along a particular route, given the primacy of Harappa in the upper Indus Basin and the orientation of its rock and mineral resource catchment area, it is not unreasonable to assume that they first came to that site before being traded elsewhere. Raw steatite may have been an especially valuable trade good for certain residents of Harappa. Recall (Chapter 7) that even though occurrences of that stone are found in most every region surrounding the Indus Valley, those that would have yielded raw material with one of the main properties that Indus consumers desired – i.e., to become white when heat-treated, are mostly located in the dolomitic sequences of the northern Subcontinent. To represent this possibly important trade good from Harappa and its the northwest rock and mineral catchment zone, I have added the word "steatite" below the placemark for the site on Figure 13.10 and have drawn orange arrows extending from it toward Haryana, Sindh and Gujarat.

Projected primary catchment areas for other Indus Civilization cities

I suggest here that most of the other major Indus Civilization cities probably had rock and mineral catchment areas similar to Harappa's in that they were

oriented toward adjacent highland regions and that certain high-value and/or unique material varieties found within each zone were traded to consumers throughout the Greater Indus region. Other researchers have made similar proposals (Asthana 1993; Fentress 1976; Lahiri 1992; Possehl 1993). However, the multi-regional model of acquisition and exchange that I offer here differs from past ones in several important ways: 1) Harappa's primary catchment area is now fairly well understood and is used to inform what those areas for the other Indus cities may have been like[7], 2) a limited number of geologic provenience determinations for artifacts from other sites have been produced (recall Figure 13.8) that provide a glimpse into acquisition patterns in other parts of the Greater Indus region and 3) I have approached the modeling of the primary catchment areas with an up-to-date perspective on the geology of northwestern South Asia that earlier researchers lacked (see pp. 50-51).

One of the most striking features of the Indus Civilization is the roughly equidistant distribution of its five largest cities – Mohenjo-daro, Harappa, Rakhigarhi, Dholavira and Ganweriwala, across the Greater Indus region (Mughal 1994a: 56). While many factors no doubt promoted the growth of those urban centers in the specific locations where they are found, in terms of providing Harappans access to stone and metal resources within and surrounding the Indus Basin, they could not have been more optimally situated, either individually or collectively. I have projected primary rock and mineral catchment areas for Dholavira, Mohenjo-daro and Rakhigarhi on Figure 13.11 using red, blue and green (respectively) highlighted terrain. The omission of an area for Ganweriwala is explained below. As each provisional zone is introduced (starting with Dholavira and then moving northward), I make predictions regarding its extent and the major rock and mineral trade goods[8] that we might expect to see associated with it.

Dholavira's primary rock and mineral resource catchment area likely encompassed all of present-day Gujarat as well as adjacent highland areas in southern Rajasthan and eastern Madhya Pradesh. Ornamental microcrystalline silicates obtained were almost without a doubt the primary exports from the city and this zone. I have represented these on Figure 13.11 using red arrows extending northward and the general term "agate," which I have confirmed (Chapter 8) was traded from sources in Gujarat to multiple Harappan sites in the Indus Valley proper. Other similar trade goods from this zone included yellow-brown banded limestone and, quite probably, "Ernestite" and amazonite.

The primary rock and mineral resource catchment area for Mohenjo-daro would have probably encompassed the highland areas of Sindh and as well as large parts of southern and west-central Balochistan. Based on its distribution at Harappan sites across the Greater Indus region, it is no doubt safe to assume that chert from the Rohri Hills was one of the primary trade goods from this zone. I have represented this on Figure 13.11 using blue arrows extending outward toward the upper and lower Indus Basin regions. Metal resources – lead metal, raw lead ores and, possibly, silver from southern Balochistan and copper from the Chagai area, were also likely important trade goods.

7) For rock and mineral resources at least, it is now possible to move beyond projecting hinterlands for Indus cities by drawing circles around site locations on a map (as in Fentress 1976: Fig. 7 and Possehl 1993: Fig.2).

8) The materials that I have associated with Mohenjo-Daro (chert), Harappa (steatite), Rakhigarhi (metals), and Dholavira (agate), were almost certainly not the only ones being exported and they may not have even been the most important. They were simply the most obvious and/or probable exports. In addition to steatite, residents of Harappa were likely exporting materials such as vesuvianite-grossular and alabaster.

Figure 13.10 The primary rock and mineral catchment area for Harappa and the projected distribution network from that city/area for steatite from the "northern" region.

Of all Harappan cities, Ganweriwala was the one most far removed from significant rock and mineral resources. Alluvial fans located about 125 km to the west of the site at the base of the southern Sulaiman Range were nearest stone sources of any kind. Basically, all that could have been acquired from them were siliciclastic sedimentary rocks for grindingstones. Alabaster and chert sources did exist around 100-150 km further westward. Also, some limestone from Harappa appears to have come from the low outcrops in the Jaisalmer area, 150 km to the south of Ganweriwala. Overall, however, the city's

regional-level acquisition options were limited. To represent this, I have placed only brown arrows on Figure 13.11 extending from the southern Sulaiman range and the Thar Desert. Given the regional limitations and its location along what was certainly a major trade and communication route between the upper and lower Indus Basin regions, Ganweriwala's primary catchment area was, largely by necessity, extra-regional in scope.

Rakhigarhi's primary rock and mineral catchment area likely encompassed material sources in the highlands both to its north and to its south. I predict that metals – gold from the Himalayas and copper from the northern Aravalli Range, will be eventually be discovered (or, in the case of copper, confirmed) to have been the major trade goods from that city/zone. These are represented on Figure 13.11 using green arrows. Steatite from sources in the northern Aravalli Range may have also been an important trade good as suggested by analyses of artifacts from Harappa and Mohenjo-daro.

The model presented here greatly simplifies what was assuredly a highly complex system. Nevertheless, it is a practical representation of what probably was the Indus rock and mineral acquisition system's multi-regional structure. The acquisition patterns evident in the assemblage at Harappa conform to the model; but that is to be expected as it was upon them that it is largely based. The question is: Will the patterns at the other Indus Civilization cities similarly conform to those predicted here? The limited work done on the matter so far suggests that they probably will. Based on my own preliminary observations of rock and mineral artifacts (both in-situ and in collections) from each of the other main Indus urban centers, I would provisionally suggest that Harappans at most of those cities were heavily exploiting raw materials from sources in the highland regions adjacent to them. Limited provenience analyses have already confirmed that some materials from each projected catchment zones were being exported to Harappa.

I wish to make it clear that the primary rock and mineral catchment areas for Indus Civilization cities that I have modeled here are economic interaction spheres and not political ones. Each zone, in fact, encompasses multiple distinct cultural phases. Harappans, "Late" Kot Dijians, Northern Neolithic peoples and, very likely, some poorly known Chalcolithic cultures in northern Afghanistan, were all included in Harappa's primary catchment area. Harappan and various non-Harappan cultural phases were similarly encompassed in most of the other projected zones. These economic interaction spheres were joined with one another primarily through inter-regional trade among Indus Civilization peoples within the Indus Valley proper. We know from other lines of evidence that the multi-regional Indus system articulated, to varying degrees, with other interaction systems far to the west of the Greater Indus region. In this study, however, I have yet to positively detect evidence for such contacts at Harappa in the form of rock and mineral artifact provenience patterns. I have a theory, which I discuss next, as to why this may be.

A brief consideration of undetected acquisition patterns at Harappa

Before closing, it may be helpful to take advantage of the broad perspective the above model offers in order to briefly consider some of the acquisition patterns that were *not* detected in this study of Harappa's assemblage. Specifically, I refer to the lack of clear evidence for long-distance external trade with the ancient peoples of Mesopotamia, Iran and Arabia. Earlier I stated that I felt part the reason such evidence failed to be detected was because of the limited number of analyses involving copper and precious metal artifacts, which I believe were the most likely imports from those distant regions. Another part of the reason has to do with Harappa's position within the Greater Indus region.

On Figure 13.12, I have drawn black dashed lines and arrows to represent the most likely routes by

Figure 13.11 Projected primary rock and mineral catchment areas for the five major Indus urban centers and the probable major raw material distribution networks for those cities/areas.

which finished goods or raw materials from areas outside of the Greater Indus region entered into the Indus Civilization's internal trade system. Note that Harappa, situated as it is in the upper Indus Basin and with its primary catchment area oriented to the northwest, is among the least optimally located urban centers in terms of access to the West Asian trade routes (only Rakhigarhi is in a poorer position). Mohenjo-daro and Dholavira, on the other hand, are the two Indus urban centers whose primary catchments areas the land and sea routes from the west would have first encountered. Therefore, there is

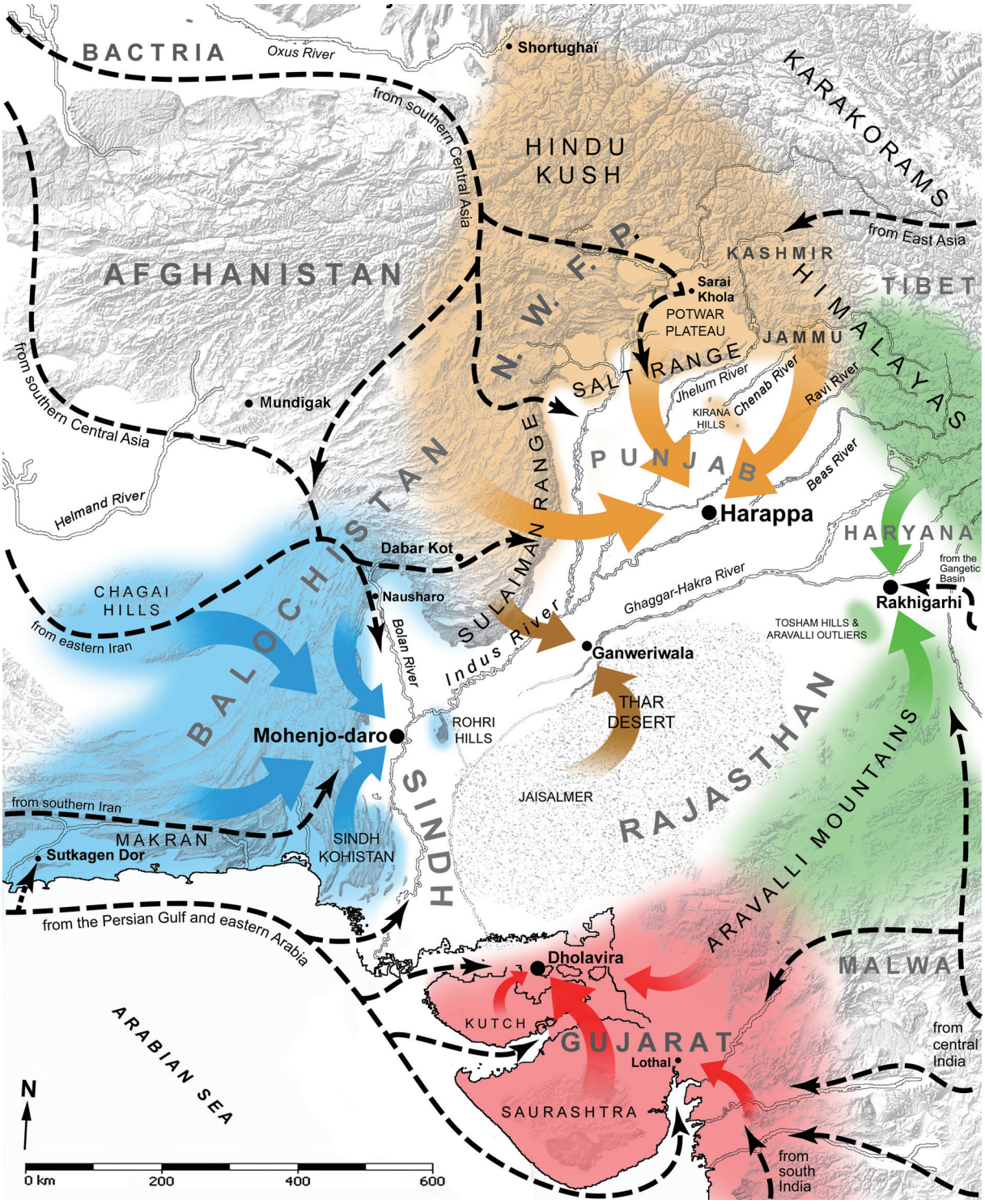

Figure 13.12 Possible routes by which finished goods or raw materials from areas outside of the Greater Indus region entered into the Indus Civilization's internal trade system.

a far greater chance that evidence for the acquisition of rocks and minerals from sources in Arabia, Iran or Mesopotamia will be found in the assemblages of those cities. Western goods could, of course, have been then transported onwards to consumers at urban centers deeper in the interior like Ganweriwala, Harappa and Rakhigarhi. However, Harappans at those cities may have had access to other, closer sources of the same material varieties. For instance, if we are talking about copper then the residents of Rakhigarhi might have had little need at all for imports because, as I have hypothesized, they had

access to and were exporting that metal from sources within their own primary catchment area. The Pb isotope analyses I have conducted on the handful of copper ores from Harappa suggest that residents there were acquiring those ores from sources both to the west of the Indus Valley (*possibly* Oman) as well as from the northern Aravallis (within the Rakhigarhi zone). Harappans at Dholavira and Mohenjo-daro, having the best access to copper from western sources, might have been using it almost exclusively[9]. When the rock and mineral assemblages of all Indus urban centers are eventually analyzed, we may see that the quantities of many imports (not just copper) at a city decreases or increases with its relative distance to the region where the Indus system articulated with external trade routes. This could explain, in part, why Arabian and West Asian goods have, thus far, failed to be detected at Harappa.

CHAPTER CONCLUSION

The extensive geologic provenience analyses that were conducted for this study on stone and metal artifacts from Harappa and others sites have helped to generate a new and detailed understanding of resource acquisition patterns and inter-regional interaction during the initial manifestation of urbanized society in South Asia. Overall, most of the rock and mineral acquisition networks in which residents of Harappa were involved appear to have, over time, expanded, contracted and shifted in ways that correspond well with the generally understood and accepted cultural/chronological sequence of late-prehistoric northwestern South Asia. Provenience determinations demonstrate that, during one period or another, people living at the site interacted, either directly or indirectly, with peoples in most every other part of the Greater Indus region. The strongest, earliest and most enduring of the inter-regional relationships residents of Harappa appear to have had were with highland peoples dwelling in areas to the north of Indus Basin. External trade with these and other groups in highland areas directly adjacent to the Indus Valley was an important and continuous aspect of the socio-economic lives of Harappa's residents. Evidence in the site's rock and mineral assemblage for contacts with distant regions such as Arabia and Mesopotamia remains elusive, however.

There is still much work to be done. In the next chapter, I offer a few brief concluding remarks on the main accomplishments of this study and then some thoughts on the future directions that this research might take.

9) Or they might not have. As this book was being finalized, Pb isotope data for artifacts from Dholavira became available that suggests northeastern Gujarat might have been the most important copper source area for residents of that Indus city.