Hafit tombs in the Wadi al-Jizzi and Wadi Suq corridors

Samatar Ahmed Botan

Photo on the cover: A cluster of Hafit tombs in the Wadi al Jizzi. Picture taken by the WAJAP team.

Hafit tombs in the Wadi al-Jizzi and Wadi Suq corridors.
A spatial analysis of Early Bronze Age (3200-2500 BC) funerary structures in the Sultanate of Oman.

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Contents

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Introduction

The third millennium BC in the Oman peninsula witnessed a dramatic change of the cultural landscape, instigating a number of transformations in the economy, socio-political organization, subsistence strategies and mortuary practices (Cleuziou and Tosi 2007, 63-97). This thesis focuses on the last aspect of these transformations, namely the mortuary practices. The appearance of above-ground tombs is usually seen as the beginning of this very interesting period. These so called ‘Hafit cairns’ (3200-2500 BC) are estimated to number over the 100.000 and are located in various environments across the peninsula, including mountains, foothills and coastal areas (fig. 1). Usually build on highly visible areas such as hilltops, these funerary structures clearly dominate the landscape. They were first investigated in the late 1950s (Glob 1959) and since then numerous examples have been excavated, mostly yielding no material or human remains and occasionally some imported ceramics from Mesopotamia which have been used to date them (Potts 2001).

Interesting enough, the settlements connected to these tombs have proven to be more elusive. Only five settlements across the peninsula can be dated to the early third millennium BC: Bat, Hili 8, HD-6, ALA-2 and al-Khasbah (Deadman 2017, 52). The reasons behind this discrepancy is not yet clear, however it has resulted in a significant gap in our knowledge of the Hafit society.

In the past decade various researchers have studied the spatial distribution of the Hafit tombs and many hypotheses have been put forward to explain the social-economical organization of the Hafit population on the Oman peninsula (eg. Deadman 2017; al-Jahwari 2013).

Figure 1. Series of well-preserved Hafit tombs

(after Cleuziou and Tosi 2007, 108).

This is not unusual within the field of archaeology as such ‘indirect’ methods have successfully been used in other parts of the world to explain the political organization of prehistoric societies (eg. Chapman 1995). The hypotheses proposed in the past ten years can be summarized as follow:

- The spatial distribution of Hafit tombs suggests that the society was organized around kinship and each cemetery symbolized a specific tribe. The fact that the tombs are positioned on highly visible places, also suggests a concern with territoriality amongst the different tribes.
- The *wadi* systems, which are dry riverbeds running through the Oman peninsula, were of utmost importance to the Hafit population. They used these systems of dry riverbeds to move between the coast and the interior in different seasons. As such, Hafit tombs are found in close proximity to a wadi system.

- The orientation of the entrances of Hafit tombs closely match the annual variation in the azimuth of the sunrise. Thus, by comparing the orientation of the tombs and the annual variation in the azimuth, it is possible to hypothesis in which season certain Hafit tombs would have been constructed.

Each of these hypotheses will be discussed in greater detail in a separate chapter. However, it is important to mention that different researchers, studying different regions of the Oman peninsula, have developed each of them separately. As such, with each new study a new hypothesis would be proposed without thoroughly testing the validity of the previous ones. A study in which the validity of *all* hypotheses are tested against a single dataset, is still lacking.
Furthermore, hardly any theory on funerary archaeology or monumentality was incorporated into any of the above mentioned hypotheses (eg. Cleuziou and Tosi 2007). This seems rather add odd, especially if we consider that we are dealing with *monumental funerary* structures. The current thesis will therefore not only test the validity of current hypotheses, but also incorporate theories on funerary archaeology and monumentality in order to better understand their spatial distribution.

Since a large amount of these funerary structures have yet not been fully documented nor excavated, this thesis will only focus on the tombs located in the Wadi Suq and Wadi al-Jizzi corridors, in the Batinah region of the Sultanate of Oman. These tombs have been documented by the Wadi al-Jizzi Archeological Project in course of six seasons. The Wadi al-Jizzi Archaeological Project (WAJAP) investigates an area of approximately 2400 km2 in the Sohar hinterlands, between the Hajar al Gharbi and the Batinah coast. This region is interesting for several reasons. First of all the Wadi al-Jizzi holds a major natural route, connecting the coast with the interior, which was used through the ages by traders, merchants and pastoralists. Secondly the region holds a very large catchment, meaning that this region enjoyed a relative abundance of water. Finally, in the historical period this region showed economic and social links between the coast and the mountains with various activities taking places on the plains in between. There is every reason to assume that similar links must have existed in the prehistory.

The Wadi Suq and Wadi al-Jizzi have been chosen as a case-study because, thus far, only limited research has been conducted in the Batinah region. Most of the research on the Hafit period has been mainly focused on the coastal sites, which are primarily focused on a maritime subsistence strategy and the exploitation of the few oases. The Batinah region on the contrary is relatively fertile compared to other parts of Oman, holds a very large catchment and thus probably sustained a higher population and therefore might provide us with new insights considering the social-economical organization during the Hafit period (Deadman, Kennet & al-Aufi 2015).

Research questions and thesis outline

The main aim of this thesis is to test the validity of existing theories on Hafit tombs, by applying them to dataset of the WAJAP. The main research question of the thesis can therefore be framed as "What is the spatial distribution of the Hafit tombs in the Wadi Suq and the Wadi al-Jizzi and can they be explained with the current theories?"

In order to answer this question, we will first need to address several sub-questions which are all related to existing hypotheses on Hafit tombs:

- What is the spatial distribution of the Hafit tombs in the Wadi Suq and the Wadi al-Jizzi? Do they differ and if so how?
- Are the Hafit tombs located in the study area orientated towards a specific direction? And if so, does it correspond to the annual variation in the azimuth of the sunrise?
- Is there a clear correlation between Hafit tombs and the wadi system in the study area?
- What is the visibility of the Hafit tombs in the landscape?

The final sub-question is of specific interest; as such an analysis of Hafit tombs has not yet been conducted. The results will also help to validate the territoriality hypothesis, discussed previously.

In order to answer these questions, we will first have to understand the ecological and human landscape of the Oman peninsula in the Bronze Age. This is important as most of the hypotheses are connected to the ecological landscape of the peninsula and its development through the centuries. These aspects will be discussed in the first chapter. The second chapter will discuss theories on funerary archaeology and monumentality. As previously noted, hardly any theory on funerary archaeology or monumentality are incorporated into any of the existing hypotheses on Hafit tombs. The chapter will also include a detailed discussion of the above mentioned hypotheses.

Chapter 3 will discuss the WAJAP in more detail and present the dataset that will be used for the various spatial analyzes. Chapter 4 will be focused on the methodology applied in the current thesis. The use of a geographic information system (GIS) and its different applications used for the spatial analyzes, will be discussed in great detail. The chapter will also present and discuss the initial results of the spatial analyzes.

The various results presented in Chapter 4 will be further discussed and elaborated in Chapter 5. The chapter will continue with an overall discussion in which the results of Chapter 4 will be held against the existing theories on Hafit tombs. The final chapter will consist of the conclusion and will also discuss suggestions for further research.

Chapter 1: The Hafit period on the Oman peninsula

As stated in the introduction of this thesis, the third millennium BC on the Oman peninsula witnessed a dramatic change of the cultural landscape, instigating a number of transformations in economy, socio-political organization, subsistence strategies and mortuary practices. In order to understand these changes it is crucial to understand and discuss the change of climatic conditions as these did not only influence past societies, but also the current archeological record. This chapter will therefore start with a short discussion on the climatic changes that occurred at end of the Neolithic (fourth millennium BC) and at the start of the Bronze Age (third millennium BC).

The chapter will proceed with a discussion on the Hafit period by looking at the few settlements which (arguably) have been dated to the period. The chapter will then continue with a discussion on the main characteristics of Hafit tombs: architectural features of the tombs, the number of burials per tomb, their location in the landscape and the grave goods usually found within these tombs. Finally, a short list will be provided of other types of tombs that have been encountered and documented in the study area. This is deemed necessary as later on we will need to distinguish between Hafit tombs and tombs of later periods in our database.

1.1 The Neolithic and Bronze Age climate

Understanding climatic conditions and climatic variability is crucial when examining archaeological records in arid regions such as the Oman peninsula. In such regions the landscape is highly sensitive to subtle shifts in precipitation and evaporation which in turn can have a fundamental impact on human societies. The current climate of Oman covers great variability in mean annual rainfall; less than 50 mm in the interior of the Rub' al-Khali desert which can increase up to 350 mm with occasional snowfalls at 3000 m in the north-eastern Hajar mountains. Rainfall occurs twice a year in Oman; in the summer due to the south-western monsoon circulation and again in winter due to the penetration of eastern Mediterranean troughs in the Persian Gulf (Lézine *et al.* 2002, 222). The average temperature in Oman varies, ranging between 29 degrees Celsius at sea level to 18 degrees Celsius at 1755 m altitude. However, this was not always the case in the past. Paleoclimatic studies conducted over the past 20 years allow us to reconstruct the climate and landscape of the Oman peninsula. A substantial dataset from the southern, central and northern part of the Arabian sub-continent indicates that after an arid post Last Glacial Maximum phase precipitation increased significantly throughout the peninsula during the Early and Middle Holocene. Pollen samples taken at Suwayh and sediment samples taken at the dry lake of Wahalah, show the development and increase of lakes and mangroves all over the Oman peninsula until 4000 BC (Preston *et al.* 2015, 10). Mangrove ecosystems are especially sensitive to climate fluctuations. The two main factors limiting their distribution are: the temperature of the coldest month, which should be a minimum of 16 degrees Celsius, and aridity (Lézine *et al.* 2002, 221). The fact that we can determine an increase of mangrove forests during the Early and Middle Holocene, indicates that a more or less tropical climate was present on the Oman peninsula.

Another paleoclimatic study, which investigated the oxygen isotope profiles of stalagmites collected from four caves across Oman and Yemen, shows the gradual southwards movement of the Intertropical Convergence Zone (ITCZ) starting around 5800 BC (Fleitmann *et al*. 2006). The study not only argues for the southwards migration of the ITCZ, but also that the annual monsoon rains that accompanied the ITCZ occurred in much shorter episodes than previously and thus an overall decrease of the annual precipitation for the northern part of the Oman peninsula (Fleitmann et al. 2006, 185).

The datasets from Wahalah, Suwayh and the study on oxygen isotope profiles of stalagmites all seem to point to a long-term shift to drier conditions starting around 5800 BC. The turn from a summer-rain dominant climate to a winter-rain dominant climate changed the landscape into a more arid one, still present to this day.

1.2 The Hafit period (3200-2500 BC)

At the beginning of the Early Bronze Age (third millennium BC), we encounter various changes in subsistence strategy, settlement pattern and burial practices. These changes seem to have occurred in very short time and are of such a large scale, that some speak of the *"Magan Great Transitional Phase"* (Cleuziou and Tosi 2007). Yet, most of these changes are still poorly understood. Our understanding of the Hafit period is primarily based on data from five sites and various hypotheses based on the distribution of the tombs. In this section we will briefly discuss these five sites, before continuing with a description of the Hafit tombs. The different hypotheses based on the distribution of the tombs will be discussed in more detail in Chapter 2.

Hili 8

The site of Hili 8 is located on the northern edges of the al-Ain oasis in what is today known as the Emirate of Abu Dhabi (fig. 2). The site has been excavated over the course of eight seasons by the French Archaeological Mission in Abu Dhabi, under the direction of S. Cleuziou. Even though a final publication is still awaited, there have been several preliminary reports which have provided much information on the growth and economic development of the site (Cleuziou 1979; 1980; 1989). The Hafit period at Hili, which was designated as Period I, is defined by the construction of a large, square mudbrick building and smaller additional structures (fig. 3). The dating of Period I is primarily based upon two C14 dates of brushwood, which seem to date the construction of the mudbrick building between 3300-2900 BC (Deadman 2017, 61; Magee 2014, 94). The finds for Period I seem rather limited. Stone tools such as hammers and grinding stones are common, while other types of artifacts such as beads and pottery are rare (Cleuziou 1989, 73-75).

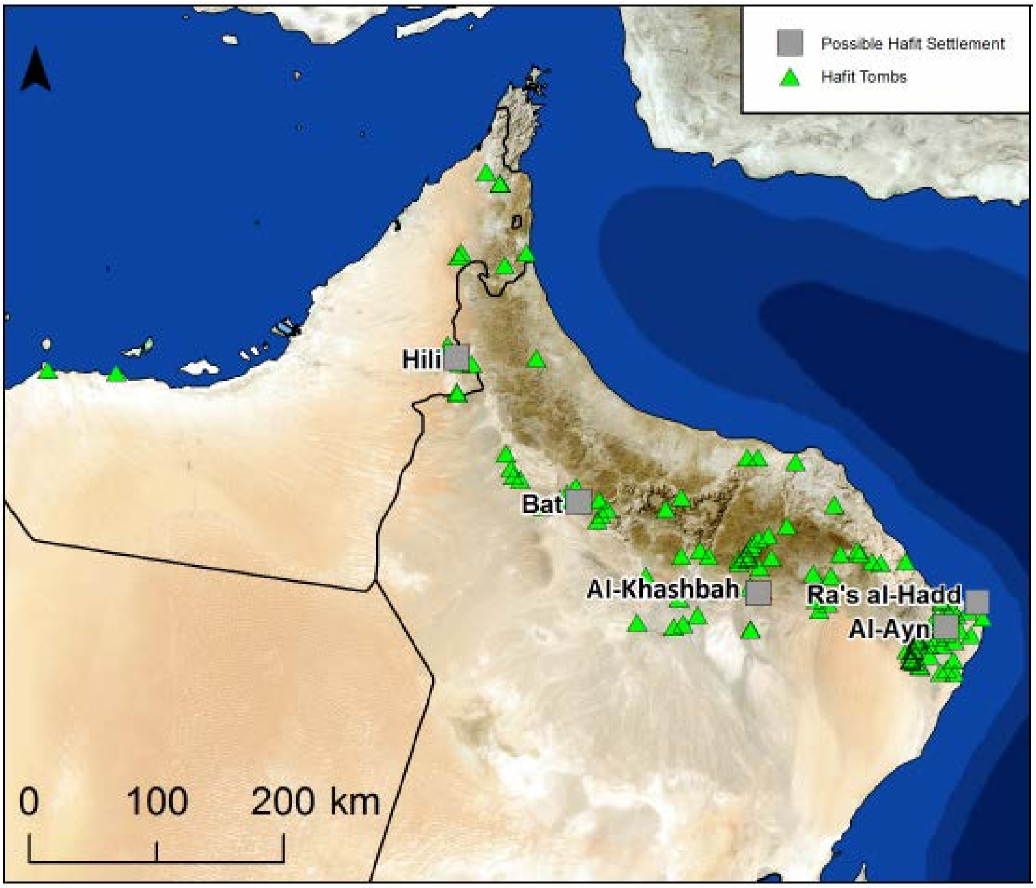


Figure 2. General map of the Hafit settlements sites in Oman

(Deadman 2017, 53).

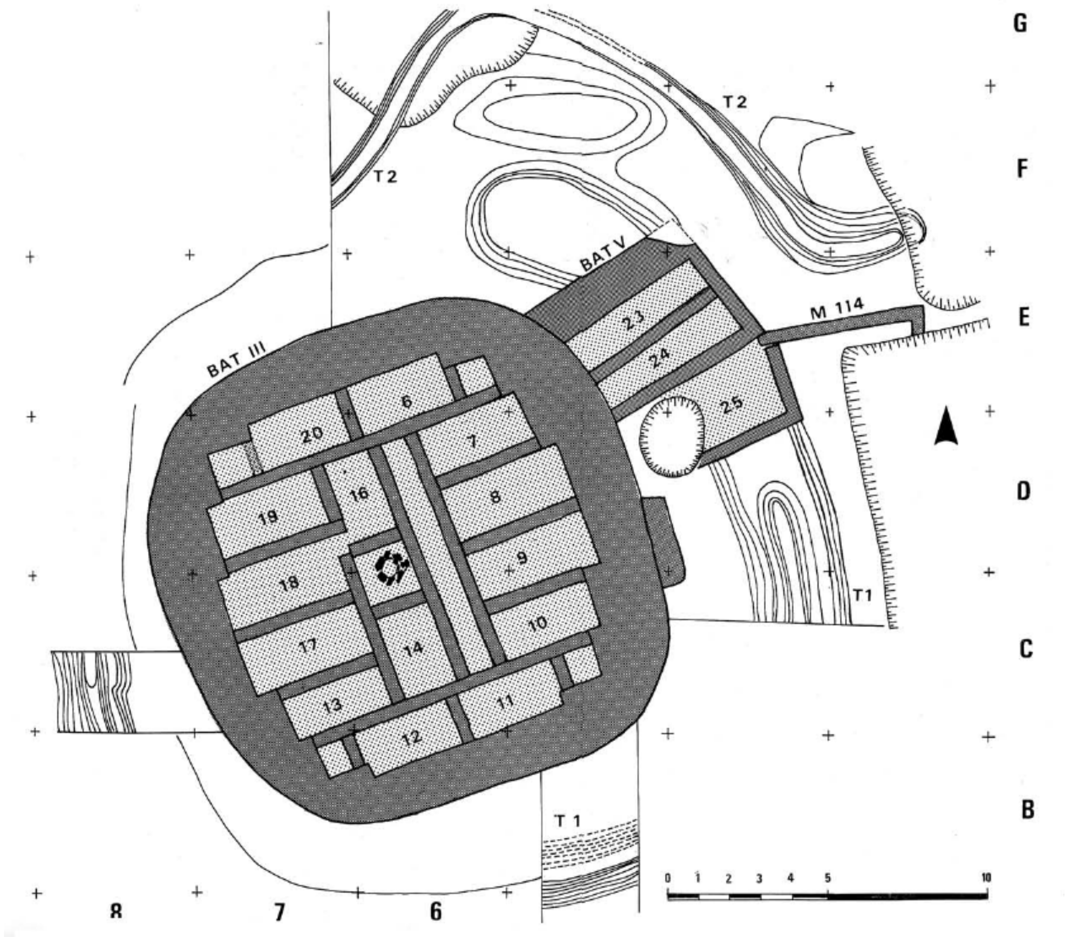


Figure 3. Plan of the mudbrick building at Hili 8 in Period I

(after Cleuziou 1989, Plate 11).

Archeobotanical and archeozoological data recovered from Hili 8 seem to point to a rather 'lush' oasis settlement where wheat, barley, oats, dates and melons were cultivated and domesticated animals such as sheep, goats and bovids were kept in close proximity to the settlement (Cleuziou 1989, 79-80).

The dating of Period I and the existence of agriculture in the Hafit period has been questioned in the past (Potts 1997). Potts has argued that the wood charcoal samples used for C14 dating at Hili 8 could actually have been several hundred years old, before it was used at Hili 8. He further argues that when you remove the wood charcoal samples from the sequence, the Hili 8 sequence fits perfectly well with other sequences such as the Tell Abraq or Hili 1 sequence (Potts 1997, 66-67). It is important to note that oldest levels at Tell Abraq and Hili 1 are dated to the Umm an Nar period or the second half of the third millennium BC. Recent research at the site seems to support the notion that the dating of Period I to the

Hafit is incorrect. Several of the domestic buildings of Period I were constructed using tomb stones of the following Umm an-Nar period (Méry 2013). This in turn seems to suggest that Period I would actually belong to the start of the Umm an Nar period (2500-2000 BC), instead of the Hafit. Both Méry's and Potts's observations become more convincing if we consider that none of the other known Hafit settlements have yielded any evidence for agriculture; let alone the similar quantities and variation of domesticated plants found at Hili 8.

Ra's al-Hadd

Ra's al-Hadd (HD-6) is a coastal site located on the eastern coast of Oman (fig. 2). The site has been excavated by the Joint Hadd Project, a collaboration between several French and Italian institutions, between 1996 and 2012. Similar to Hili 8 several preliminary reports have been published (Azzara 2013; Cattani 1997; 2003; Tosi *et al.* 2001;), yet an overall final publication of the site is still lacking. The dating of the site to the Hafit period is based on eight charcoal samples and one tooth enamel sample which have all been dated to 3100-2700 BC (Azzara 2013; Hilbert and Azzara 2012).

The excavations revealed several structures with single or multiple rectangular rooms of different dimensions (fig. 4). The structures consist of mudbricks laid in courses and bonded with mortar (Deadman 2017, 53). Many of the buildings also contained hearths, while large ovens were located outside the structures. Finds from HD-6, such as shell rings, baskets and fishing equipment, seem to suggest that the majority of them were produced on-site (Azzara 2009). The vast quantity of beads made from various materials, such as stealite, stone, chlorite and shell found in different buildings seem to suggest that bead production occurred at a domestic level and in every household (Hilbert and Azzara 2012).

The botanical and faunal remains from HD-6 point towards an extensive marine exploitation. Large quantities of oyster, mussel, crab, turtle, dolphin and various fish species were recovered (Cleuziou and Tosi 2007, 93).

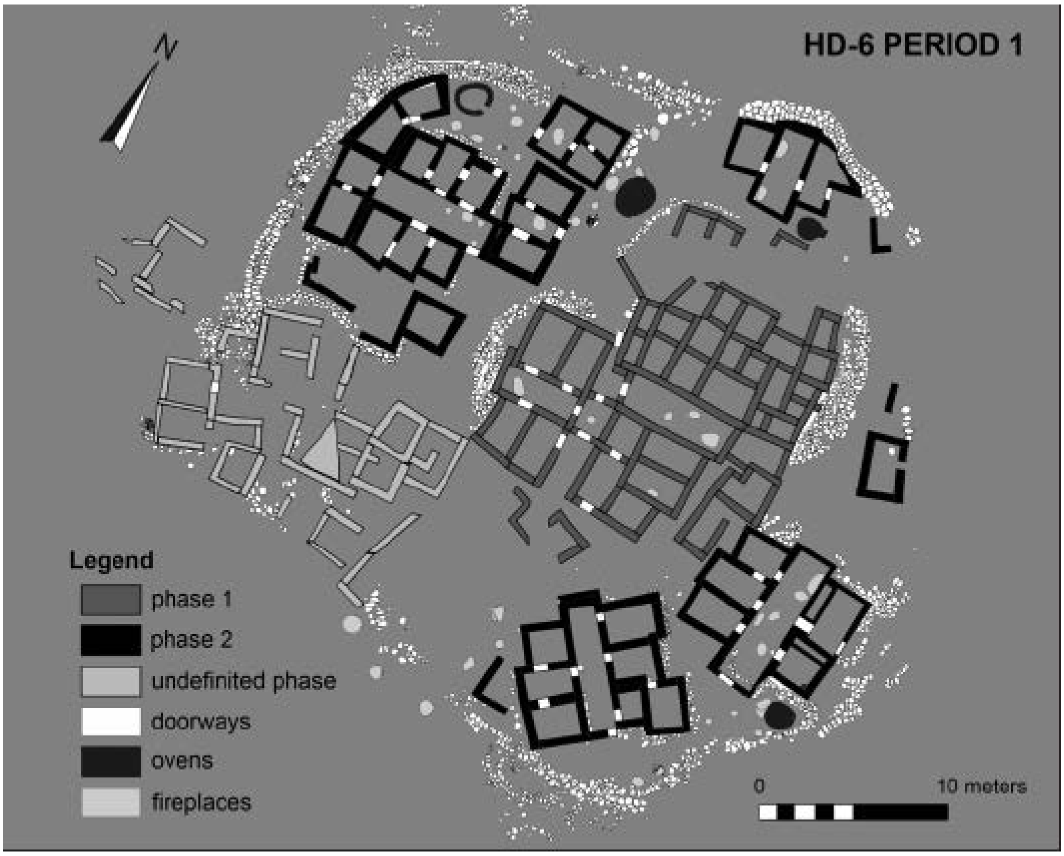


Figure 4. Plan of HD-6 displaying the various excavated structures

(after Azzara 2012, 435).

Al-Ayn

The site of Al-Ayn (ALA-2) is located in the Ja'alan region and was excavated as part of the Joint Hadd Project in 2004. A full publication of the excavation is not yet published, yet a short and unreferenced description of the site was published in 2007 (Blin 2007).

One single building has been excavated, consisting of a square structure made of unworked stone blocks (fig. 5). The presence of postholes inside the building seem to suggest that the building might have been partially covered by a light roof. No internal divisions were recognized, except for a hearth at the center of the building (Blin 2007, 249). Compared to Hili 8 and HD-6, there were relatively few artefacts at ALA-2 which compromise of a few flints and beads (Blin 2007, 249).

C14 samples have been recovered from the site. However, as of yet the results have not been published. The main argument for a Hafit date is based on the site's position in the landscape, which corresponds to the center-of-gravity of a large group of Hafit tombs (Giraud 2009). Yet this argument seems somewhat flawed, as several tombs of the following Umm an Nar period are also found in close proximity to the site (Deadman 2017, 61).

Figure 5. The excavated structure at ALA-2

(after Blin 2007, 249).

Bat

The site of Bat (fig. 6) actually consists of two separate locations, Bat 1146 and Bat 1147. Both sites contain a round tower, typical for the Umm an Nar period, which according to the excavators might have been built in the Hafit period. Excavations beneath the towers yielded the remains of one or two structures made of stone and mudbrick as well as a layer of loamy sediment which could be indicative for irrigation (Thornton *et al* 2013, 256). Two charcoal samples, one found within the mortar and one within the walls of the structures, yielded a date between 3030-2480 BC (Thornton *et al* 2013, 257). The interior of the structures was at both locations later filled with mudbricks of different sizes and thick mortar in order to create a platform. This platform functioned as the foundation for the Umm an Nar towers. The excavators suggest that the mudbrick platform encountered at both location, were constructed in the Hafit period. Their argument is further strengthened by the few ceramic finds. Three sherds of Jemdet Nasr pottery were found in the earliest layers and early Umm an Nar sherds in the later layers. A broken pestle as well as several small copper artefacts such as prills, rings and pins were also recovered from the earliest layers (Possehl *et al* 2009, 7).

Al-Khashbah

al-Khashbah is located in the governate of al-Sharqiyyah in the Sultante of Oman and covers a total area of 12 square kilometers (fig 2). The site was first visited by the German team of the Bergbau-Mueseum in the late 1970s and 1980s. Several of the stone-built towers on the site were documented, but no excavation took place (Schmidt and Döpper 2017, 1). The site was re-visited between 2004 and 2009 by al-Jahwari as part of the Wadi Andam survey (al-Jahwari and Kennet 2010). In 2015 and 2016 a survey and excavation were commenced by Tübingen University under the directions of Conrad Schmidt and Stephanie Döpper.
In two years the Tübingen team surveyed and recorded 310 structures. The majority of these structures consisted of cairns, but several stone towers were also recorded. In 2015 small-scale excavations were started on these stone towers, with the aim of recovering stratified material in order to date them (Schmidt and Döpper 2017, 5). One of these buildings, Building V, features a round stone wall with a diameter of 25 meters which was still preserved up to a height of 1.1 meters (fig. 6). Charcoal samples taken from between the walls seem to suggest that the building was founded at the end of the fourth millennium. On the surface and during the excavation thousands of copper-slags, prills and furnace fragments were found, indicating that building must have been used for intensive copper processing during the Hafit period (Schmidt and Döpper 2017, 5). Excavations at another part of the site uncovered a series of ditches of three meters deep and four meters wide, as well as several mudbrick structures. Some stone tools for grinding and hammering were also recovered. Ten charcoal samples taken from different parts of the mudbrick structures as well as from the ditches yielded a coherent date of *c.*2800 BC (Schmidt and Döpper 2017, 5-7). Even though the excavations

are ongoing, Schmidt and Döpper (2017, 8-10) argue that the site must have been an industrial site which was occupied only seasonally in the Hafit period.

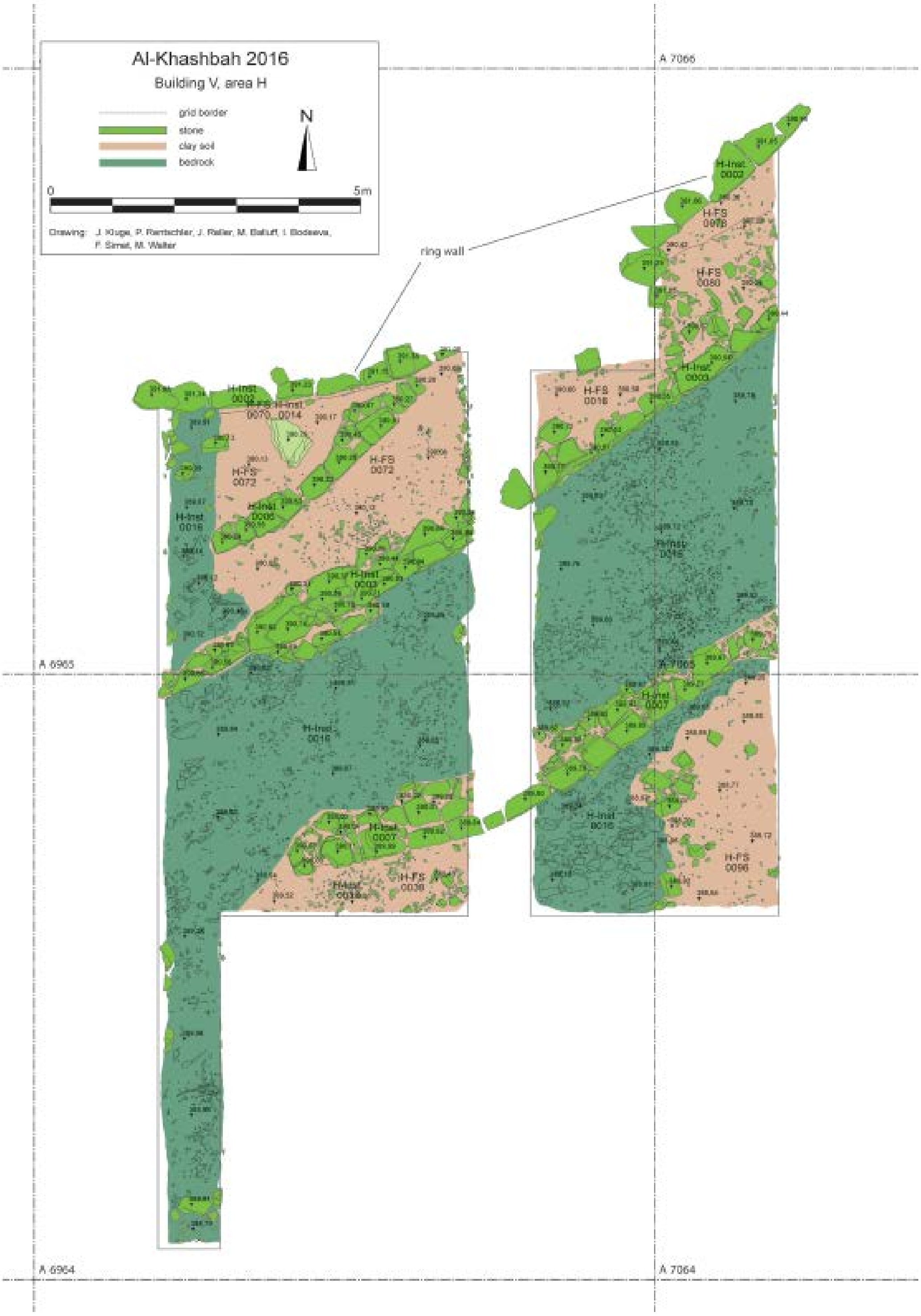


Figure 6. Excavation plan of Building V at al-Khashbah

(Schmidt and Döpper 2017, 6).

As it is clear by now, the start of the Early Bronze Age is archaeologically still quite undefined. The main problem is a lack of Hafit settlements. As discussed earlier, at the moment there are only five sites that can be dated to the Hafit period. It is therefore that most of the theories concerning the Early Bronze Age have been mostly been based on the interpretation of Hafit style tombs. The next section will discuss this type of burial and the various theories concerning their distribution.

1.3 Hafit tombs

The very first description of Hafit type tombs derives from the Danish expedition which visited the Al-Ain area and Jebel Hafit in 1959 (Glob 1959 in Boehme 2011). They decided to coin these structures “Hafit cairns”. The term *cairn* is derived from Scottish Gaelic and usually refers to artificial piles of stones, not necessarily in a funerary context, located on top of hills and mountains. The word was chosen for the striking similarities existing between collapsed Hafit tombs and the better known prehistoric stone tumuli of Northern Europe. Since then a significant number of these tombs have been excavated (Deadman 2017, 65) and even though minor differences exist between the Hafit tombs that have been excavated, the similarities surpass the differences.

Hafit tombs are collective, above ground burial structures built of unworked stone. The burial chamber is either circular or oval, with a diameter between one and two meters and has a paved floor consisting of flat slabs (Cleuziou and Tosi 2007, 112). The burial chamber is subsequently surrounded by one or several concentric, circular walls containing large, rounded boulders with smaller cobbles as a filling. The whole construction is then roofed with corbelling stones and a flat top. In turn this creates a tomb with an overall diameter between five and seven meters. The minor differences between Hafit tombs usually consist of the addition of a third concentric wall or the use of different types of stones to create a bigger contrast with the landscape (Deadman 2017, 65-69).

Thus, the *main* architectural features of Hafit tombs can best be described as: collective burial structures made of unworked, locally available stones, built in a circular/semi-circular manner with one or several courses of corbelled walls, which in turn create a rough dome over the burial (fig. 7). The state of preservation of the domes has led some scholars to identify the better preserved examples as separate types of tombs, the so called ‘beehive tombs’ due to their beehive like shape, while the more collapsed examples were labeled as ‘Hafit cairns’ (Deadman 2017, 66; Frifelt 1975 in Boehme 2011). The chamber usually contains two to five buried individuals. In the coastal regions such as Ja’alan, some of the excavated tombs contained up to 20-30 individuals with no apparent sex or age selection (Cleuziou and Tosi 2007, 111-112). The entrance is usually sealed by erecting the final, outer ring wall or is sometimes closed off with movable stones. These funerary monuments have a height of four to five meters, however there are some tombs documented that are as high as eight meters and ten meters in diameter (Deadman and Kennet 2015; Yule and Weisgerber 1998).

The location of Hafit tombs seems also to be consistent, as they are often found on highly visible locations such as on ridges or low foothills. Within the different environmental zones of the Oman peninsula they mostly occur within the large wadi systems of the interior (Deadman 2017, 73).

Assessing the type and number of grave goods is rather problematic as a vast majority of the Hafit tombs has been completely looted or emptied and re-used in later periods. Yet from the few preserved examples we can deduce that imported pottery vessels from Mesopotamia were the main type of grave good (fig. 8). The number of vessels per individual tends to be rather low, usually one or two pots (eg. Williams and Gregoricka 2013). Beads made of chlorite, serpentine or steatite are also commonly found in Hafit tombs, though in slightly lower quantities than pottery vessels. Some tombs have also yielded small numbers of copper/bronze artifacts. They usually consists of awls, needles and pins, but knives and daggers have also been reported (Deadman 2017, 86).

Analysis of human remains has proven to be problematic as well, because of the poor preservation of the material. Nonetheless, some tombs have yielded well preserved skeletal remains which could be properly analyzed (eg Williams and

Gregoricka 2013). As previously stated, Hafit tombs are collective burials and as such people of all ages and both sexes were interred. The body is usually laid down in a flexed position and on one side, though the side and direction the person faces varies (eg. Jasim 2012, 127-128; Salvatori 2001, 69; Williams and Gregoricka 2013, 140). Some of the more detailed studies produced evidence for osteoarthritis, healed fractures and rickets, indicating a rather physically stressful lifestyle and nutritional deficiencies (eg Williams and Gregoricka 2013). Studies of the dental record showed heavy attrition and few caries, which are comparable to analyses of the teeth of modern bedouins who rely on a mixed subsistence economy of grain, fauna and dairy (Deadman 2017, 92).

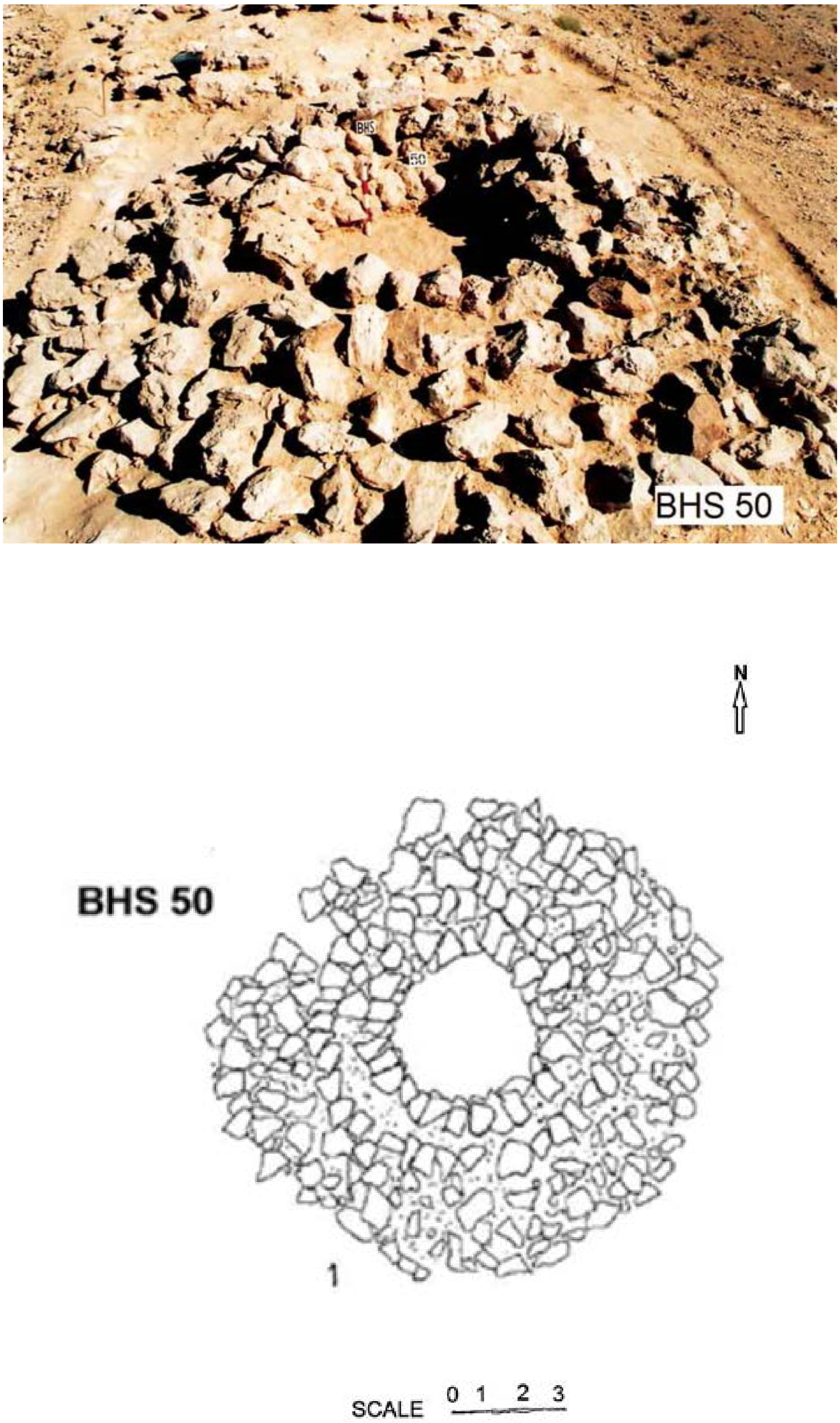


Figure 7.Example of an excavated Hafit tomb at the site of Jebel Buhais. Scale indicates the amount of meters

(after Jasim 2012, 145, 285).

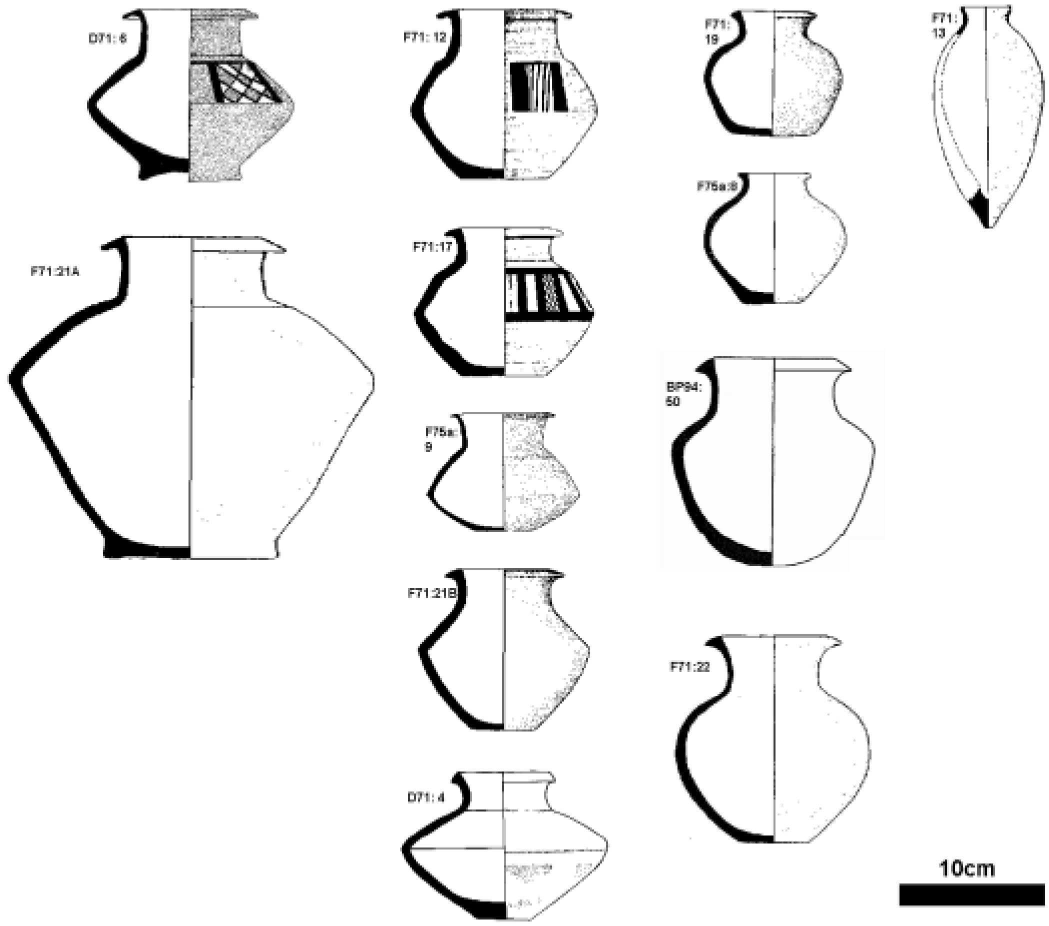


Figure 8. Selection of the types of pottery vessels recovered from Hafit tombs

(after Deadman 2017, 82).

1.4 Other types of tombs in the study area

Hafit tombs are not the only funerary structures which can be found in the study area. Different types of tombs, varying from the Bronze Age to the Islamic period, have been found and documented by the Wadi al-Jizzi Archeological Project in the past five years. It would be futile to discuss each type in great detail, as some of these types can not be dated and might even be unique to the region (Saunders *et al.* 2016, 189-200). Therefore an overview of the most occurring and well dated types will be presented in this paragraph.

Umm an Nar (2500-2000 BC) tombs

The period following the Hafit witnessed a rather dramatic change in funerary rituals. Large circular tombs consisting of well-selected stones, or even re-worked limestone blocks, and divided into various chambers became the norm (fig. 9). The number of interments per tomb also rose dramatically. Whereas in the Hafit period the number of interments varies between a handful and a few dozen, in the subsequent Umm an Nar period this number rises to several hundred (Cleuziou and Tosi 2007, 129). The location of these tombs is also different from those in the proceeding Hafit period. Whereas the Hafit tombs are usually located highly visible locations such as on ridges or low foothills, Umm an Nar tombs occur on flattened plains and low plateaus, on different elevations and in the close proximity of an Umm an Nar settlement (Cleuziou and Tosi 2007, 126; Magee 2014, 101).

Figure 9. A reconstruction of an Umm an Nar tomb in the al-Ain oasis, United Arab Emirates (after Magee 2014, 100).

Wadi Suq (2000-1600 BC) tombs

The Wadi Suq period witnessed another dramatic change in funerary rituals. The tradition of constructing tombs above ground, which lasted over a millennium, gives way to elaborate subterranean tombs of varying sizes (fig. 10). A variety of tombs sometimes even occurred at a single cemetery, such as Jebel Buhais (Jasim 2012). The practice of burying both sexes and people of all ages together in a single tomb without any differentiation still continued (Jasim 2012, 290). The correlation between Wadi Suq tombs and settlements is rather unknown, as only a handful of Wadi Suq settlements have thus far been found and excavated.

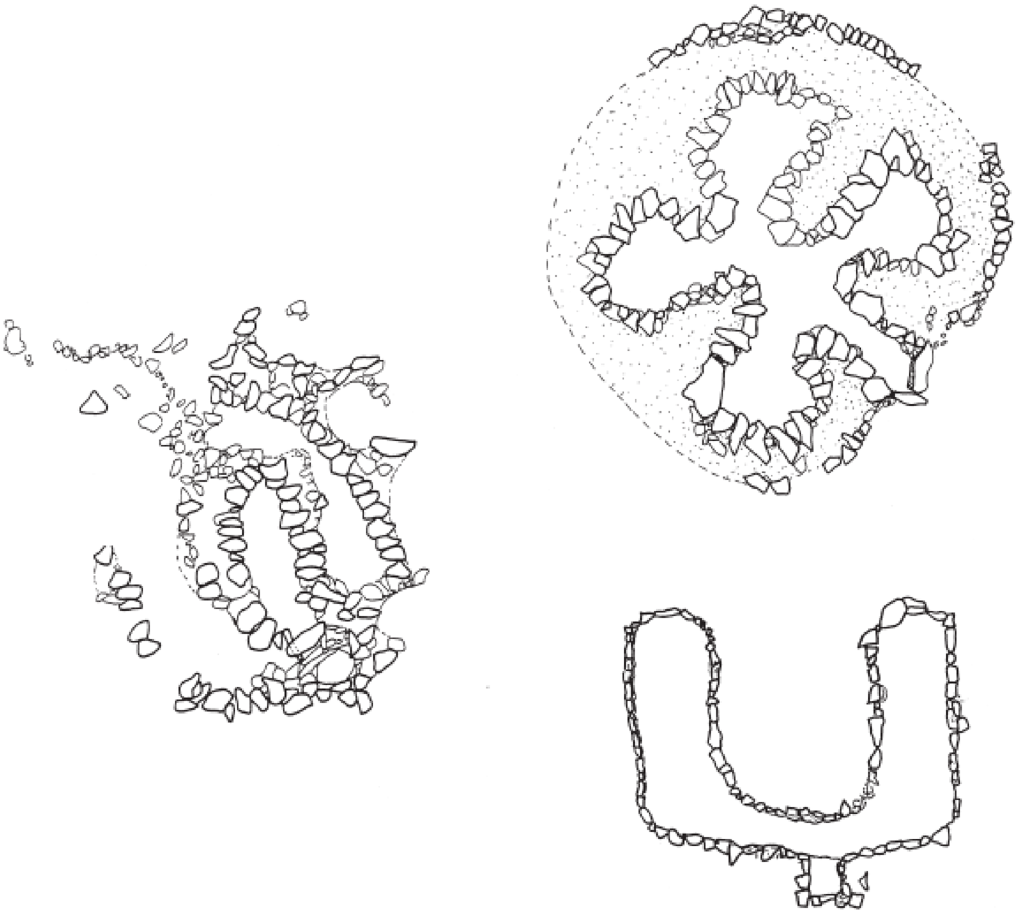


Figure 10. A few examples of Wadi Suq tombs

(after Magee 2014, 188).

Iron Age (1100-300 BC) tombs

The Iron Age period is characterized by the re-use of older tombs on a large scale. Despite this phenomenon, we do witness the emergence of two new tomb types: cell graves and honeycomb tombs (fig. 11). The first type is characterized by the use of rounded stones in the construction, an oval/horseshoe shape, lack of an entrance and usually occur in agglomerated groups (Saunders *et al.* 2016, 191). These types of tombs can easily be mistaken for Hafit tombs if they are in poor condition, especially when we consider that both types can occur on ridgelines. The honeycomb tombs consist of large stones, without any 'packing' of the walls, forming different chambers and thus creating a 'honeycomb' like structure. The number of chambers varies per tomb, but usually these type of tombs contain five to seven chambers (Saunders *et al* 2016, 194).

Of the few excavated examples which yielded good skeletal material we can conclude that, similar to previous periods, both sexes and people of all ages were buried together. In a few cases, such as at the site of Jebel Buhais, it was observed that males were usually buried in a flexed position on their right side, whereas females were buried on their left side (Jasim 2012, 293).

Excavated tombs of both types have yielded several Iron Age ceramic finds as well as some iron artefacts, suggesting that these tombs might have been in use up till the end of the first millennium BC (Saunders *et al* 2016, 189-195).

However, recent fieldwork in the Sultanate of Oman by the Wadi al Jizzi Archaeological Project (WAJAP) questions this long held theory. The cell graves in the Wadi al Jizzi, or terraced cairns as they are labeled by the project, are very similar to other known examples across the region. Yet the finds corresponding to these tombs can be dated to the first centuries AD and in particular to the Sasanian period (see next paragraph), arguing for a post-Iron Age date for these type of tombs (Düring and Olijdam 2015).

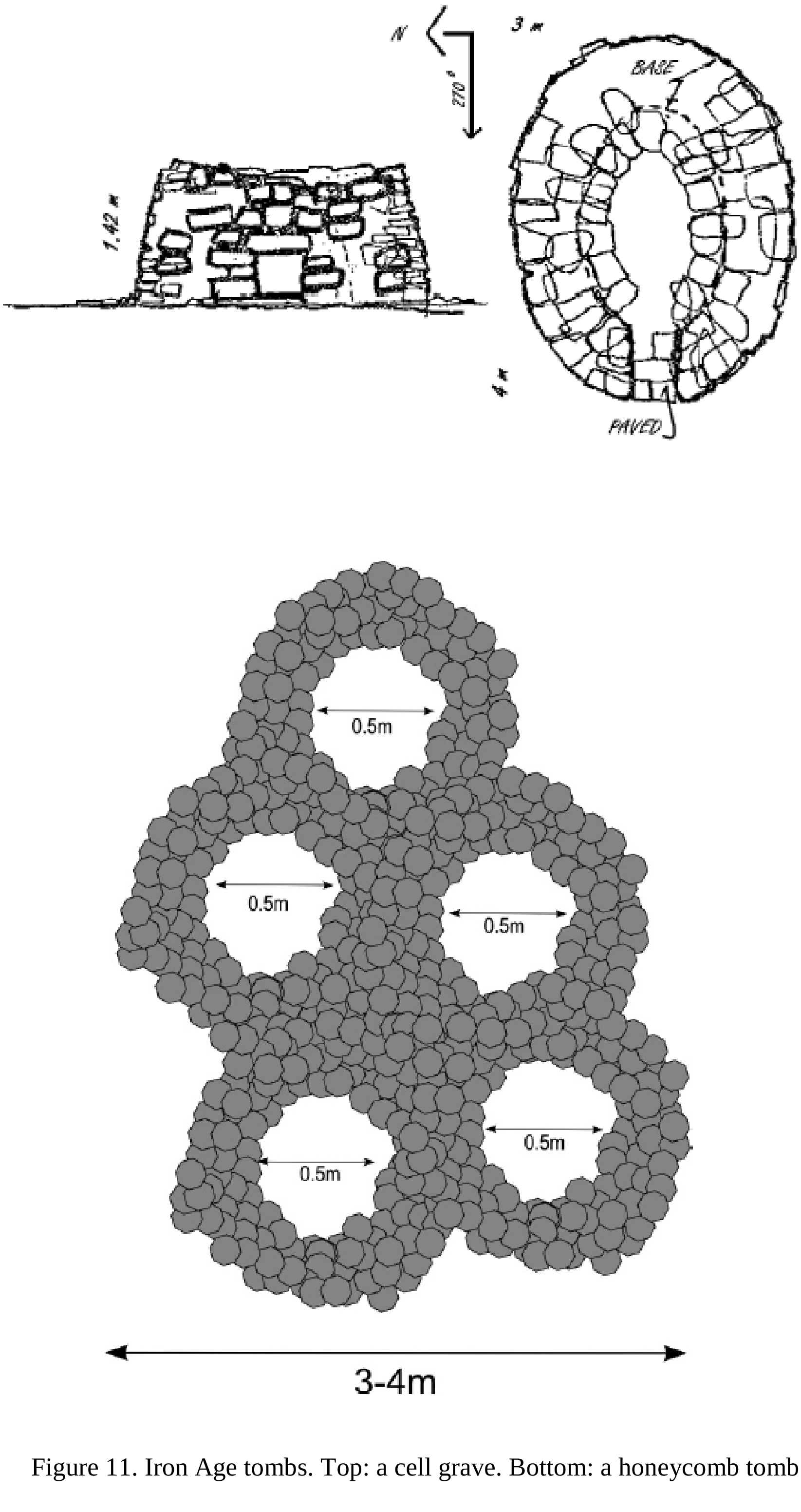


Figure 11. Iron Age tombs. Top: a cell grave. Bottom: a honeycomb tomb (after Saunders *et al.* 2016, 192 and 195).

Sasanian period (250-653 AD) tombs

Tombs of the Sasanian period are characterized by the so called ‘oval terraced cairn’ (Düring and Olijdam 2015). These tombs have clearly visible terraced walls and a narrow corbelled chamber (fig. 12). They can occur separately, in rows or even in clusters and are usually four meters in length, 2.6m in width and one meter in height (Düring and Olijdam 2015, 101). The top of the tomb is usually covered by large, flat stones. As stated in the previous paragraph, these tombs are usually referred to as cell graves in other parts of the region and are often incorrectly dated to the Iron Age.

It is important to note that the dating of these tombs by WAJAP is a relative dating based on the surface finds associated with them. The finds include turquoise glazed pottery, several metal object, glass vessels and stamp seals of the Sasanian period.

Figure 12. Example of the Sasanian oval terraced cairn

(after Düring and Olijdam 2015, 102).

Conclusion

This chapter has tried to summarize the current data on Hafit settlements and tombs. Even though there are tens of thousands of Hafit tombs, there are only five known settlements dated to the same period. The site of Hili 8 is well documented and published over the course of several decades. Nonetheless, the dating of its earliest levels has been called into question. The fact that a large part of the Hili 8 dating sequence falls within the Umm an Nar period, except for two dates, and the fact that several of the domestic buildings of Period I were constructed using tomb stones of the following Umm an-Nar period; seem to argue against a Hafit date for the earliest levels. This is significant, as it goes against the notion that Hili 8 had extensive agriculture as early as the Hafit period. A similar problem also occurs at the site of Al-Ayn. The main argument for a Hafit date for this site is based on the site's position in the landscape, which corresponds to the center-of-gravity of a large group of Hafit tombs. However, the same argument can be made for an Umm an Nar date, as several tombs of this period are also located in close proximity to the site.

With the site of Bat we are on slightly firmer grounds. The find of a mudbrick platform and coinciding Jemdet Nasr pottery underneath an Umm an Nar tower, seem to support the notion that at least *some* activity took place at Bat during the Hafit period. How long these activities took place and whether the site was permanently occupied during the Hafit period is rather difficult to prove without any supporting C14 dates. The best evidence for Hafit settlements derive from the sites of al-Khashbah and Ra's al-Hadd (HD-6). Both of these sites have many more charcoal samples than the previous ones and all the C14 dates point to an occupation at the start of the third millennium. It is also worth mentioning that neither al-Khashbah nor Ra's al-Hadd have, so far, yielded any evidence for agriculture.

In contrast to the settlements, the number of Hafit tombs is abundant. Thousands of these so called Hafit *cairns* exists throughout the Oman peninsula. There exists many minor variations on their architecture, yet their main architectural features can be summarized as: collective burial structures made of unworked, locally available stones, built in a circular/semi-circular manner with one or several courses of corbelled walls, which in turn create a rough dome over the burial. The location of Hafit tombs seems also to be consistent, as they are often found on highly visible locations such as on ridges or low foothills. The number of interments usually varies between two to five individuals. However, in the coastal regions such as Ja'alan, some of the excavated tombs contained up to 20-30 individuals with no apparent sex or age selection. The number and type of grave goods is problematic to assess as a large number of these tombs have been looted in antiquity or in modern times. However, from the few preserved examples we can deduce that imported pottery vessels from Mesopotamia, various types of beads made of chlorite, serpentine or steatite were the most common grave goods. Finally, a short summary of other types of tombs found in the study area was provided with an emphasis on the architectural differences between those tombs and the Hafit ones.

Chapter 2: Theoretical framework

Even though the study of burials, human remains and cemeteries can be arguably traced back to the 19th century, it is only in the past six decades that multiple theories and approaches have been developed and discussed on these topics. In this chapter we will first briefly explore the development of funerary archaeology over the past 50 years. The chapter will then proceed with a short discussion on *monumentality* and *mortuary monuments*. This is deemed necessary as Hafit tombs are often monumental markers in the landscape. The chapter will continue with an introduction to the *territorial model*, which had (and still has) a profound impact on funerary archaeology. The chapter will then be concluded with a discussion on the various theories on the Hafit period which have been proposed in recent years.

2.1 Funerary archaeology

Material remains of the dead as well as the treatment and commemoration has been studied by archaeologists as early as the 19th century. However it is only in the past 50 years that the focus has shifted to the social context of death. The start for this shift has been often credited to Binford's paper entitled 'Mortuary practices: their study and potential' published in *Approaches to the Social Dimensions of Mortuary Practices* in 1971 (cf. Chapman 2003, 306). In his paper Binford criticized the cultural historical approaches that emphasised the movement of people and transmission between cultures. He argued that mortuary practices should be studied in their social context and archaeologists, as well as anthropologists, had to consider the social persona of the deceased which is *''the composite of the social identities maintained in life and recognized as appropriate for consideration at death''* (Binford 1971, 17).

According to Binford six main 'dimensions' of the social persona can be distinguished in mortuary rituals: age, sex, social position, sub-group affiliation, cause of death and location of death. He hypothesised that if other aspects are considered to be equal, then *''the heterogeneity in mortuary practice which is characteristic of a single socio-cultural unit would vary directly with the complexity of the status hierarchy, as well as the complexity of the overall* *organisation of the society with regard to membership units and other forms of sodalities"* (Binford 1971, 14-15). After testing his hypothesis against a sample of 40 non-state societies from the Human Relations Area Files Binford concluded that the results confirmed that the form and structure of mortuary practises of a society are conditioned by the form and social complexity of that given society (Binford 1971, 23).

Binford's paper was widely cited in the 1970s as providing the theoretical basis for archaeological analyses of the dead, even though he has not written another paper on this topic ever since. The following decade a focus on the use of quantitative methods was preferred in mortuary studies, such as cluster analysis and principal components analysis, in order to search for evidence of social ranking and status and thus measure the inequality of a society.

Throughout the 1970s concerns were expressed about the extent to which certain social types, such as chiefdoms, were actually visible in the archaeological data. Goldstein (1976) and Tainter (1977) for example, expressed their concerns for using burial evidence to attribute past societies to evolutionary type imported from anthropology. These concerns accumulated to a full-scale debate by the 1980s within the context of what was to become known as the post-processual turn. Hodder for example used burial customs among the Mesakin Nuba of Sudan to argue against the proposal that the patterns visible in death and funerary customs, *directly* reflect patterns in the life of a society (Hodder 1980 in Chapman 2003, 308). The Mesakin Nuba burial customs were an *ideal* rather than a *direct reflection* of society. Social relations could be altered or distorted in death, in preference for ideas and symbols of purity and fertility. Such symbolization was according to Hodder neglected by the New Archaeology championed by Binford and Clarke (Chapman 2003, 309).

Parker Pearson (1982) further developed this notion and argued that ideology and ritual could be used to conceal the real relations of power within society. Mortuary practices could thus be used and manipulated by the living for their own interests. His arguments placed the living as an active agent in the design and

execution of mortuary practices as well as placing the decision making process within a wider economic and political context (Chapman 2003, 309).
Both Hodder and Parker Pearson were part of a wider critique of processual archaeology. Post-processual archaeologists argued that aspects such as attitude, meaning and symbolism are at the centre of human experience and that processual archaeology had neglected these aspects. The post-processual school sees funerals *"as lively, contested events where social roles are manipulated, acquired and discarded"* (Parker Pearson 2003, 32). Therefore, the material remains retrieved from funerary contexts by archaeologists do not form passive and static datasets that directly represent societies, but are in themselves part of the active and dynamic manipulation of people's perception, beliefs and allegiances.
The positions of 'processualist' and 'post-processualist' are not mutually exclusive. As Brown points out: *''the controversy over the use of burials as symbolic representations of the social order or as objects symbolizing political manipulation is not a problem of the exclusive legitimacy of one or other perspective in mortuary analysis''* (Brown 1995, 21).

The theoretical debate on mortuary practices has continued to be built on the basis of ethnography in the past two decades (eg. Parker Pearson 2003), even though archaeologists are now more aware of the deficiencies of the ethnographic record such as the sample size studied in time and space. The increase and change of theories in the discipline has also led to the revisiting of topics which were hardly discussed in the previous century. These topics such as gender or post-mortem agency, which explores how the dead still impact the living, have shifted the focus from the social group to the individual (Arnold and Jeske 2014, 330). Even the role of modern social media and its application to create virtual communities engaging with mortuary archaeology, has become a lively topic for discussion within the discipline in more recent years (Williams and Atkin 2015).

2.2 Monumentality

All past societies lived in a world surrounded by landmarks, which arguably can be labelled as natural places such as waterfalls, mountains, woods, lakes and other similar features. The significance of these places must have been recognised by these societies and could have been attributed to natural, supernatural or ancestral forces. The construction of the first built monuments by humans may have indicated a profound change in the human mind: rather than inheriting the world as it is, they actively sought to change it (Parker Pearson 2003, 157). It is possible to create a rather broad division of different types of artificial monuments based on their function: monuments linked to production (for example field systems and quarries), monuments linked to infrastructure (for example roads and docks), monuments linked to defence (for example defensive walls and forts) and monuments linked to a special function (such as temples and burial places; cf. Clark and Martinsson-Wallin 2007, 29-30). However, these definitions are to broad and in the case of funerary structures not really helpful.

Other definitions, which are more applicable when dealing with funerary structures, have been proposed in the past five decades. However, discussing each single definition that has been proposed in the past 50 years would be pointless and beyond the scope of this thesis. Therefore, we will only discuss the most important and those applicable to the current thesis topic. Elliot defined a monument as early as the 1960's *as "any structure build to evoke a memory"* (Elliot 1964, 52). This notion was supported and built upon in the 1990's by Lefebvre who argues that *"monuments are symbolically charged media that compress and contain a dynamic network of meaning, which in turn is critical to the mediation of social relations in human communities"* (Lefebvre 1991 in Johansen 2004, 319). Moore argues that monuments are *"public structures designed and built to be both non-prosaic and clearly recognizable forms of the built environment"* (Moore 1996 in Johansen 2004, 319). Trigger applies a broader definition of monumentality and argues that monumental architecture can be defined as *"any man made construction of which its scale and elaboration exceeds the requirements of any practical functions that it needs to fulfil"* (Trigger 1990, 199). To summarize the above mentioned definitions: a monument (or in the case of this thesis: a mortuary monument) can be defined as a man-made construction exceeding its functional requirements and which is built in a non-mundane and clearly recognizable manner, in order to convey one or several meanings.

When studying past societies through their mortuary landscapes, it is important to note the *memorial aspects* of mortuary monuments. Even though monuments can convey several meanings and messages, in the case of mortuary monuments the primary message is one of remembrance. A mortuary monument is foremost a place in the landscape created to remember the deceased and how society perceived the deceased. When a living person sees the monument, they may remember the individual buried there, or the building of the monument or even the act of burying the deceased. It is not hard to imagine how mortuary monuments can create a powerful presence in the landscape trough their visibility, durability and memorial aspects. This presence can in some cases even project a sense of property and ownership on the landscape, even when the living are not present. The concept of property and ownership of the landscape through man-made monuments is one of the key notions of what has been labelled as the 'territorial model'.

2.3 The territorial model

In 1970, Arthur Saxe published his doctoral research entitled *Social dimensions of mortuary practices* in which he attempted to construct a body of theory and models on *"how treatment of the dead is related to other elements of socio-cultural systems"* (Saxe 1970 in Goldstein 1981, 59). He tested his theories and models with ethnographic data from the Temuan of Malaysia, Kapauku Papuans, the Ashanti and the Bontoc Igoroto of Luzon. Of these theories, his Hypothesis 8 became highly influential. His Hypothesis 8 claimed that *"to the degree that corporate group rights to use and/or control crucial but restricted resources are attained and/or legitimized by means of lineal descent from the dead (i.e. lineal* *ties to ancestors), such groups will maintain formal disposal areas for the exclusive disposal of their dead and conversely"* (Saxe 1970 in Goldstein 1981, 59). In 1976 Lynne Goldstein reanalysed Saxe's ethnographic data and added data on settlement patterns, subsistence, inheritance, corporate groups, critical resources and disposal areas of over 30 other societies. However, she is best known for her summary article published in 1981 in which she sub-dived Saxe's Hypothesis 8 into three separate but related sub-hypotheses (Goldstein 1981, 61):

1. *"To the degree that corporate group rights to use and/or control crucial but restricted resources are attained and/or legitimized by lineal descent from the dead (i.e. lineal ties to ancestors), such groups will, by the popular religion and its ritualization, regularly reaffirm the lineal corporate group and its rights. One means of ritualization is the maintenance of a permanent, specialized, bounded area for the exclusive disposal of their dead".*

2. *"If a permanent, specialized, bounded area for the exclusive disposal of the group's dead exists, then it is likely that it represents a corporate group that has rights over the use and/or control of crucial but restricted resources. This corporate control is most likely to be attained and/or legitimized by means of lineal descent from the dead, either in term of an actual lineage or in the form of a strong, established tradition of critical resources passing from parent to offspring".*

3. *"The more structured and formal the disposal area, the fewer alternative explanations of social organization apply, and conversely".*

Goldstein was, however, clear that considering the wide range of variability in cultures, even when there are similar economic and environmental conditions, there is a low probability that certain groups will symbolize and ritualize aspects of their organization in precisely the same manner (Goldstein 1981, 61). Goldstein's adaptation of Saxe's Hypothesis 8 is often referred to as the Saxe/Goldstein hypothesis. The significance of this hypothesis lies in its suggestion that the organization of corporate groups, and thus the mortuary practices, will respond very quickly to changes in the relationship between the society and its economic environment. Corporate groups have been defined by anthropologists according to different criteria, however the most useful for archaeologists is the definition suggested by Hayden and Cannon: *“groups that function as individuals in relation to property”* (Hayden and Cannon 1982, 134-135).

Another important study that connected tombs, and especially monumental tombs, was Colin Renfrew’s study of Neolithic megalithic tombs on the islands of Arran in west Scotland and Rousay on the Orkney Islands. Renfrew's hypothesis argued that territoriality in segmentary societies *may* be symbolically expressed through funerary monuments (Renfrew 1976 in Chapman 1995, 31). He defined segmentary societies as societies *“lacking the centralized, hierarchical structure of a chiefdom or state”* and territory as *“the habitual use of a specific, localized area which constitutes the sphere of influence of the individual or group”* (Renfrew 1976 in Chapman 1995, 31). Renfrew proposed three criteria for categorizing the ways in which territorial behaviour could be expressed in the Neolithic mortuary landscape:

1. Simultaneously functioning tombs should exhibit a regular rather than a clustered spatial distribution.

2. Monumental tombs should be sited in close relationship with better agricultural soils that might have been used by each territorial group.

3. There should be no evidence of social or political hierarchy.

He subsequently used Thiessen polygons to define territorial units around known monumental tombs. Even though there were no settlement traces in the archaeological record he claimed that by combining tomb distribution and the territorial model, it was possible to detect social units on both islands (Renfrew 1976 in Chapman 1995, 44-45).

Goldstein's, Renfrew's and Saxe's studies had a profound impact on the archaeological field in the 1970's and 1980's and influenced many archaeologists conducting research on prehistoric monuments and/or prehistoric cemeteries. Chapman for example used the Saxe/Goldstein hypothesis in combination with Renfrew's theory on megalithic tomb distribution on the monumental tombs of Neolithic West-Europe to argue that territoriality can be strongly or weakly marked and even 'turned off' at times (Chapman 1981 in Parker Pearson 2003, 134). Others have applied Renfrew's theory or the Saxe/Goldstein hypothesis to areas such as the Republic of Ireland, Denmark and even the Central Mississippi Drainage (eg. Chapman 1995, 34-35; Charles and Buikstra 1983).

Critique on these studies came with the rise of post-processual archaeology in the mid-1980s and early 1990s. Hodder, for example, argued that the territorial approach neglects the 'meanings' of tombs and their significance in a particular historical context. He continues that it is rather impossible to test the theories that consider tombs as territorial markers, without also having some theories focusing on the meaning of tombs in the society and time period in question (Hodder 1984, 52-53). Richards argued that Neolithic people did not imagine tombs as territorial markers when constructing them or when approaching them with the dead (Richards 1992 in Chapman 1995, 37). Morris argued that, like with most archaeological methodology, the territorial model is neither right nor wrong, but one should combine it with theories on social structures and the actor’s perceptions in order to explain complex matters such as funerary landscapes (Morris 1991, 163).

2.4 Past research and theories on the Hafit period

In the past decades several attempts have been made to explain the Hafit period. As stated in the previous chapter, all of these studies are mainly focussed on the interpretation of Hafit tombs as hardly any well-dated settlements of the period have been found, excavated and well published. During-Caspers (1971) was the first to theorize about the nature of the Hafit society. She argued in the early 1970s that the Mesopotamian pottery usually found in Hafit tombs is indicative for groups of Mesopotamian merchants who had a trading post or even a colony in the Oman peninsula (During-Caspers 1971 in Deadman 2017, 94-95).

However, the most elaborate theory was constructed by Cleuziou in the late 1990s and early 2000s. Based on his research at Hili and the Ja'alan region (see previous chapter) he developed one of the more sophisticated and detailed models for the Hafit society. In a series of publications Cleuziou argued that the social and economic changes which occurred at the start of the Hafit period, were the result of the conscious decision made by the population to adopt new agricultural and pastoral technologies in order to support increasingly complex social developments (Cleuziou 2003; Cleuziou and Tosi 2000). The adaptation of these new technologies led in turn to an increase in population and a more intense exploitation of the environment. He further argued that the Hafit society developed along a unique Arabian evolutionary path in which the social structure never evolved towards a hierarchical organization, but remained grounded in kinship and tribal ties (Cleuziou 2003, 140-141). As such, power and wealth were not accumulated by individuals, but rather shared within the tribe. Cleuziou therefore envisioned a society organized around kinship on three levels: the nuclear family, the extended family and the tribe (cf. Deadman 2017, 96). The nuclear family would be sharing a house and a family tomb, the extended families would be building houses and tombs in clusters and the tribe would share and maintain the settlement and cemetery. He further argued that the Hafit economy was predominately based on agriculture through the cultivation of fruits and cereals grown under the shade of palm trees (Cleuziou 2002, 200). The rise of obviously visible cemeteries during the Hafit must therefore clearly be linked to an increased concern with territoriality, as this form of agriculture required enormous territorial investment and needed to be protected (Cleuziou 2002, 201).

Cleuziou's model of a society based on kinship and cemeteries used to mark territory is clearly influenced by the territorial model of the 1970s and 1980s (see previous paragraph). Nonetheless, Cleuziou's model for the Hafit period has influenced various other scholars in the past decade. Giraud for example investigated the Ja'alan region situated on the southern edge of the Oman Mountains. 3096 Hafit tombs were initial identified from satellite imagery and subsequently surveyed and confirmed on the ground. Giraud (2010, 72) identified Hafit tombs as:

- Tronconic tombs made from local stones and with a single and circular burial chamber.

- They have double walls separated by an interior space filled with gravel and smaller stones .
- They are located in rocky areas on top of highly visible places

Using these criteria out of the 3096, 2661 were considered for analysis as they were considered to be clear examples of Hafit style tombs. It is important to note that Giraud does not mention the state of preservation of these tombs, nor their average measurements such as length and diameter. Thus it is rather difficult to evaluate her dataset or her chances of misidentifying tombs of later periods, such as Iron Age or Sasanian type tombs.
She then continued by placing all of the 2661 tombs within a GIS framework, in which they could be categorized in 54 necropolises. Then she calculated their centres of gravity and suggested the possible existence of four or five large regional centres (fig. 13). These results were subsequently compared with the dataset from the Umm an-Nar period. Interesting enough, there were many similarities between both datasets, leading the author to the conclusion that such a large degree of continuity could only mean that the inhabitants of the Ja' alan region utilized agriculture as early as the fourth millennium and lead a sedentary life (Giraud 2010, 79-83).

Al-Jahwari not entirely convinced by the methodology used by Giraud and restudied the density of the Hafit tombs located in the western part of the Ja'alan region. The methodology used by al-Jahwari to identify the tombs involved driving along the main roads and stopping to check the rough rocky hills. He then used a hand-held GPS to record the coordinates of the tombs, surveying the ground for finds and taking photographs of each tomb, and sometimes drawing a sketch plan of the structure (al-Jahwari 2013, 105). It is unclear if al-Jahwari had specific criteria on how to identify Hafit tombs, before he started his survey. It seems rather that he recorded all of the possible tombs located in the area and subsequently developed a summary of their specifics (al-Jahwari 2013, 148-149):

- They are built with large stones of different sizes and colors with smaller stones mixed in between.
- They are located on top of ridges, slopes and sometimes even on lower wadi

terraces.

- They are encountered in clusters, each cluster consisting of several tombs.
- They have two to four concentric walls with varying thickness (30 cm – 1 m).
- Burial chambers of semi-circular or oval shape with a diameter varying between 1 to 2.5 meters.
- The overall size of the tombs measures between 3 to 12 meters in diameter.

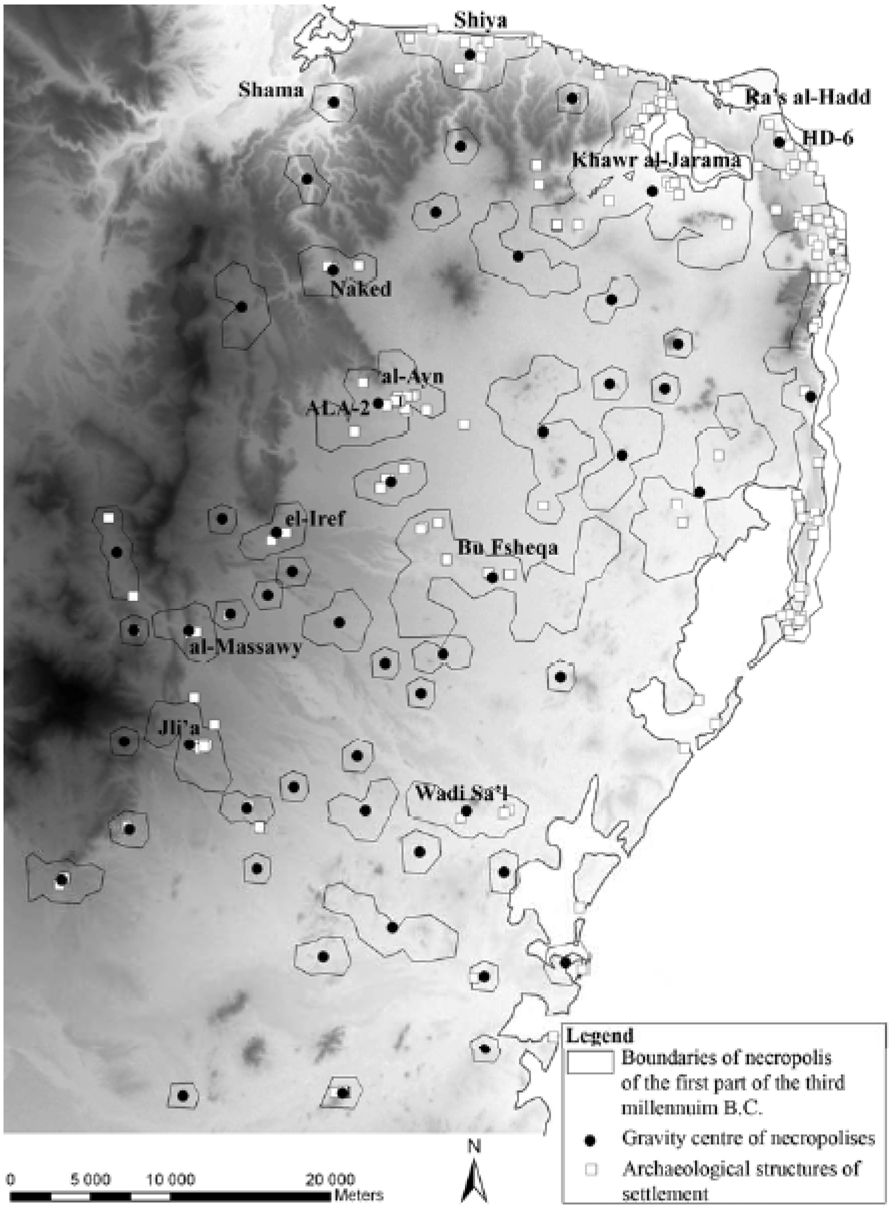


Figure 13. Map displaying the centres of Hafit necropolis in the Ja'alan region

(after Giraud 2010, 76).

It must be stated though that al-Jahwari recognizes some of the discrepancy in his dataset. For example, several of the finds he collected around some of the tombs are clearly of the Iron Age (al Jahwari 2013, 148). Nonetheless he argues that due to the fact that they are found on the same locations as other well-known Hafit tombs, that they show similar construction techniques and that they are located in those areas where there is no proof of other occupation; that it is most likely that the majority of the tombs are Hafit (al-Jahwari 2013, 148-149). However, as stated in Chapter 1, tombs of the Iron Age and Sasanian period can easily be mistaken for Hafit tombs if they are in bad condition. Especially as these type of tombs are constructed with locally available stones and occur on the same locations as Hafit tombs. Al-Jawhari does point out that a vast majority of the tombs in his survey area were badly preserved, making identification difficult (al-Jahwari 2013, 148). So one has to ask how many tombs he might have misidentified?

Nonetheless, having located even more tombs than Giraud, a total of 5000 tombs were recorded and studied in the course of three seasons. By analyzing their distribution, positioning and the rock art located on some of the tombs, al-Jahwari concluded that most of the tombs were concentrated around wadis with large catchments and date-palm groves. The author subsequently suggested that the tombs might have been constructed by nomadic or semi-nomadic pastoral groups, moving from one site to another in search of grazing pastures for their livestock and that the rock art on the tombs functioned as tribal ownership (al-Jahwari 2013, 172).

The problem though with al-Jahwari's analysis and conclusion is the fact that, due to his broad definition of Hafit tombs and the poor preservation of the structures, he clearly misidentified several tombs of the Iron Age and perhaps even of the Sasanian period as being Hafit. It is unclear how many of these tombs have been misidentified (a few tombs or entire cemeteries?), but it is clear that the number of 5000 tombs should be lowered. This in turn could seriously affect the conclusions of his research. If, for example, complete cemeteries of later periods were misidentified as Hafit, than it is possible that different type of tombs were concentrated around different types of environments. The Hafit tombs *could* have been concentrated around the large water catchments, but is also possible that during the Iron Age (or later periods) tombs were *actually* concentrated around agricultural lands such as date-palm groves.

In the same period Deadman studied the distribution and orientation of Hafit funerary structures located in Wadi Adam in the al-Sarqiyah region (Deadman 2012). His dataset consisted of over 4000 tombs of which most had been identified using Google Earth. Through ground-based fieldwork in one season, he could narrow this amount down to a total of 2800 Hafit and Umm an Nar tombs. One has to wonder how these tombs were identified and recorded on the ground, as it would be very difficult for one individual to record such a large quantity of tombs in a single season. Nonetheless, by plotting these tombs in a GIS map, applying Landsat ETM imagery and a 30m resolution Aster digital elevation; Deadman calculated that almost 90% of the Umm an-Nar tombs could be found within 2.5 km of arable land, contrary to the Hafit tombs which on average seem to be located nearest to wadis that have a large catchment area upstream (Deadman 2012, 29).

In the next year Deadman studied the orientation of the entrances to Hafit tombs found at three different sites within the Wadi Andam region: Fulayj, Khashbah and Uyun. Even though most of the entrance of the tombs were severely disturbed or at times no longer present, Deadman could still collect a dataset comprising of 42 preserved entrances. When the tomb entrance orientation of all three sites are displayed collectively, an interesting pattern emerges (fig. 14). Ranging from east-north-east to east-south-east, the distribution centers at around 90 degrees due east. This closely matches the annual variation in the azimuth of the sunrise for that part of Oman (Deadman 2014, 142). Even though Deadman does not specifically mentions it, he seems to imply that the tombs must have been built while the sunrise was still visible, otherwise it would not have been possible to orientate the entrances towards the point of sunrise. Thus the author concluded that due to their close proximity to water catchments and their orientation towards the sunrise, the Hafit tombs must have been built by a nomadic society that travelled through the wadis and spent winter in the northern elevated areas, while spending the summer on the southern plains (Deadman 2014, 149).

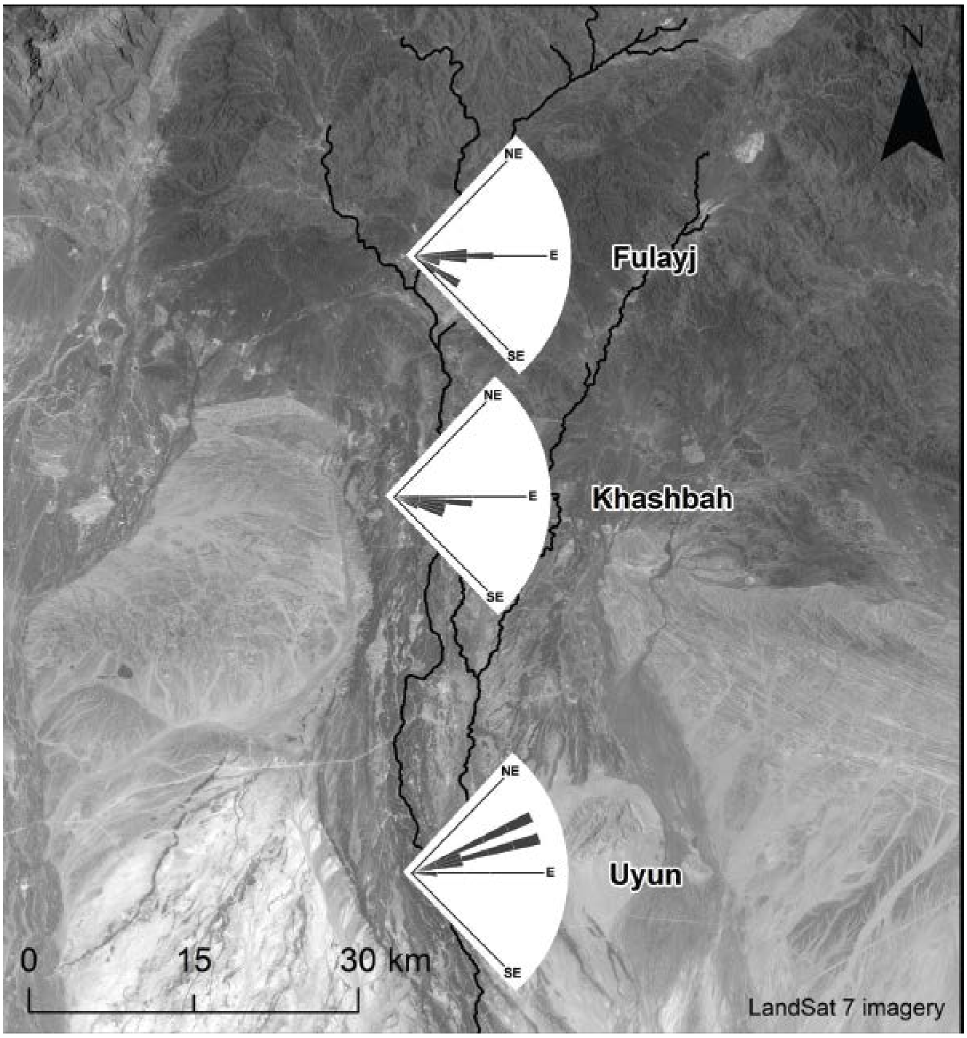


Figure 14. The orientation of the tomb entrances for each of the cemeteries in the Wadi Andam (after Deadman 2014, 143).

Both of Deadman's studies were part of his PhD thesis, in which he further elaborated on his research by identifying another 6000 Hafit tombs in the Batinah region with Google Earth. With a combination of ground truthing and GIS analysis, he concluded that the vast majority of Hafit tombs are concentrated in the low hills between the coastal plain and mountains (Deadman 2017, 424). Deadman provides one of the more elaborate summaries of known Hafit tombs in his PhD dissertation (Deadman 2017, 66-72). Even though Deadman recognizes the many slight differences and variations which are present in their architectural composition, he nonetheless distinguishes more similarities than differences. The criteria created by Deadman (2017, 120-121) for Hafit tombs are among one of the most detailed:

- Hafit tombs are detached, roughly circular tombs with a central, single, circular or oval corbelled chamber, accessed in most cases through a small rectangular, triangular or trapezoidal entrance.
- They are on average between 5 and 7 meters in diameter, but with a minimum of 3m.
- They consists of at least one double wall, made of unworked and locally available stones.
- The outer wall is smoothly faced due to the careful selection and laying of the stones and the void in between the two faces is packed with rubble.
- The wall is carefully corbelled inwards to form a false dome, giving the tombs a curved, beehive-like look.
- In most cases one or more additional ring walls is added to this basic structure.

Even with such a very detailed definition of Hafit tombs, Deadman admits that tombs of other periods (such as Iron Age and Sasanian tombs) could easily be mistaken for Hafit (Deadman 2017, 125). Especially when dealing with poorly preserved and/or collapsed tombs, which are rather common throughout the Sultanate of Oman. However, to argue against any misidentification (similar to the research done by Giraud and al-Jahwari), Deadman argues that it is possible to distinguish between the different types of tombs. He noticed for example that when dealing with collapsed tombs it is still possible to identify Hafit types, as in most cases the lowest courses of stones or the foundation of the tomb would still be preserved thus providing for a plan of the original structure (Deadman 2017, 125).

His research also revealed a strong relationship between Hafit tombs and a linear outcrop of Tertiary rock present on the Batinah (fig.15). According to Deadman this geological formation could have formed an aquiclude, a solid impermeable area underlying an aquifer. Such an aquiclude could have brought water to the surface and thus make certain parts of the Batinah region more attractive to the Hafit population (Deadman 2017, 425). It is important to note that this theory is very specific to the Batinah region and Deadman admits that in other parts of the Oman peninsula the situation might be quite different.
Finally, Deadman also studied the relation between Hafit tombs and the so called

Late Prehistoric Tombs (LPT's), which are other types of prehistoric tombs occurring in the same areas as Hafit tombs and often mistaken as such. Examples of these tombs are 'Honeycomb Tombs' of the Iron Age period and the 'Cell Graves' 'Hut Graves' which he also dates to the Iron Age (Deadman 2017, 120-125). His study showed that Hafit density clusters contain fewer tombs than LPT clusters, usually consist of a single tomb and that Hafit tombs are located at a far greater distance from one another than LPT's (Deadman 2017, 276). This distribution of Hafit tombs is more in line with a nomadic population, while the distribution of the LPT's seems to point to a more sedentary society (Deadman 2017, 276-278). We will return to this rather interesting hypothesis in Chapter 5.

All of these results led Deadman to argue that the Hafit society was primary based on nomadic pastoralism, rather than agriculture as proposed by Cleuziou and Giraud (Deadman 2017, 425 versus Cleuziou 2003 and Giraud 2010). Nonetheless, he does agree with the application of the territorial model on the Hafit period and argues that *"the northern Oman Peninsula was divided into territories occupied by small, related nomadic groups, centered around wadi basins and, in the Batinah, Tertiary aquiclude outcrops"* (Deadman 2017, 425). The results of Deadman's analysis and its application to the Wadi al-Jizzi will be discussed in greater detail in Chapter 5.

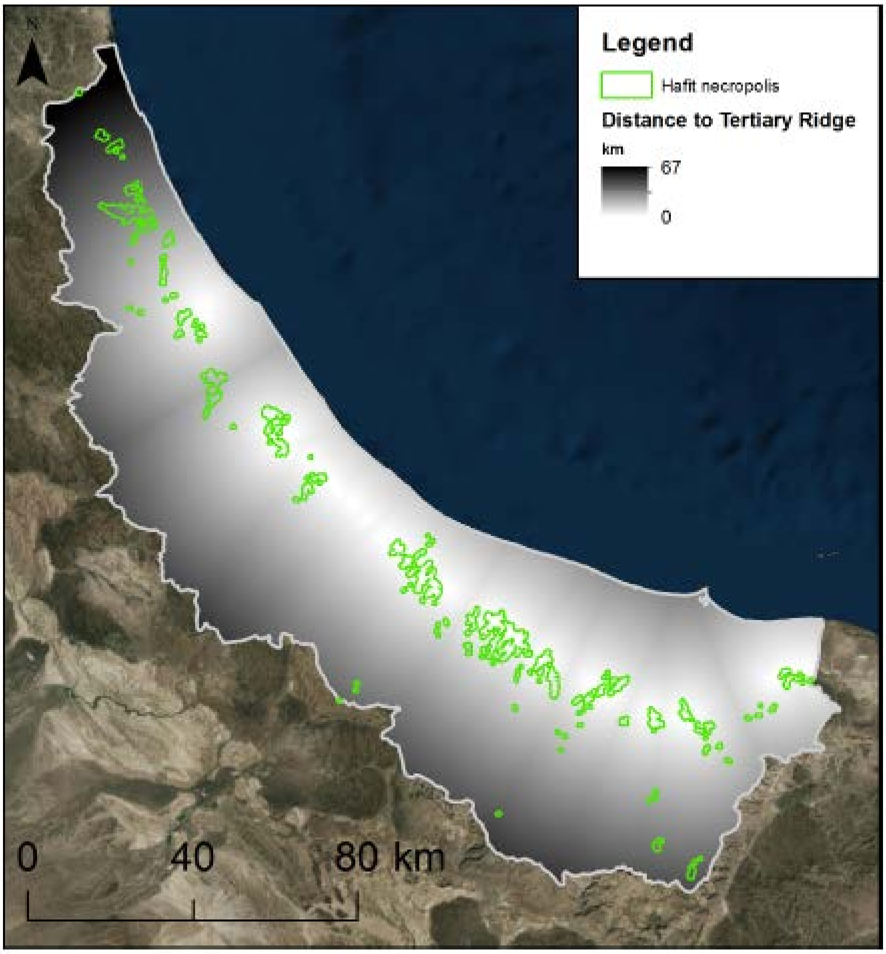


Figure 15. The distance between Hafit necropolises and the Tertiary outcrop (after Deadman 2017, 269).

Conclusion

An overview of the development of funerary archaeology in the past 50 years was provided in this chapter, as well as several definitions for monumentality. This is deemed necessary as Hafit tombs overlap both: they are monumental, funerary structures. The chapter also discussed the territorial model which had (and still has) a profound impact on funerary archaeology, especially those concerned with prehistoric societies. The strength and weakness of the model have been discussed. In the past decades several attempts have been made to explain the Hafit period, by analyzing the tombs. One of the most elaborate and influential theories on this topic was constructed by Cleuziou in the late 1990s and early 2000s. Based on his research at Hili and the Ja'alan region, he argued that the social and economic changes which occurred at the start of the Hafit period, were the result of the conscious decision made by the population to adopt new agricultural and pastoral technologies in order to support increasingly complex social developments. The adaptation of these new technologies led in turn to an increase in population and a more intense exploitation of the environment, through the cultivation of fruits and cereals grown under the shade of palm trees. He thus concluded that the emergence of obviously visible cemeteries during the Hafit must therefore clearly be linked to an increased concern with territoriality, as this form of agriculture required enormous territorial investment and needed to be protected.

More recent studies on Hafit tombs have used statistics and GIS techniques to argue for certain theories. Giraud used a dataset of 2661 Hafit tombs located in the Ja' alan region to categorized them into 54 necropolises. Then she calculated their centers of gravity and suggested the possible existence of four or five large regional centers in the Hafit, which seemed to continue into the following Umm an Nar period. Thus she argued that the large degree of continuity could only mean that the inhabitants of the Ja' alan region utilized agriculture as early as the fourth millennium and lead a sedentary life.

Using a larger dataset from the western part of the same region, al-Jahwari came to an entirely different conclusion. By analyzing the distribution and positioning of over 5000 Hafit tombs, as well as the rock art located on some of the tombs, al-Jahwari concluded that most of the tombs were concentrated around wadis with large catchments and date-palm groves. He subsequently suggested that the tombs might have been constructed by nomadic or semi-nomadic pastoral groups, moving from one site to another in search of grazing pastures for their livestock in which the rock art served as tribal ownership.

The criteria used by both Giraud and al-Jahwari to identify Hafit tombs have been discussed and critically reviewed. The final and most recent study discussed in this chapter, is the research conducted by Deadman as part of his PhD. In the course of three years Deadman studied the overall distribution of Hafit tombs, as well as the orientation of their entrances in Wadi Adam in the al-Sarqiyah region of the Sultanate of Oman. He concluded that Hafit tombs are on average more likely located nearest to wadis that have a large catchment area upstream and that the orientation of the entrances centers at around 90 degrees due east. This closely matches the annual variation in the azimuth of the sunrise for that part of Oman.

Both of these aspects led the author to conclude that due to their close proximity to water catchments and their orientation towards the sunrise, the Hafit tombs must have been built by a nomadic society that travelled through the wadis and spent winter in the northern elevated areas, while spending the summer on the southern plains. Finally, Deadman also argued for a strong relationship between a linear outcrop of Tertiary rock present on the Batinah. According to Deadman this geological formation could have formed an aquiclude, a solid impermeable area underlying an aquifer, which could have brought water to the surface and thus make certain parts of the Batinah region more attractive to the Hafit population to settle or claim as their territory for certain parts of the year.

The results of Deadman's analysis and its application to the Wadi al-Jizzi will be discussed in greater detail in Chapter 5.

Chapter 3: Dataset of the Wadi al-Jizzi Archaeological Project

This chapter will introduce the study area of the Wadi al-Jizzi Archaeological Project (WAJAP), in which the dataset for the current thesis was generated. The chapter will then continue with a discussion on previous research conducted in the region, a short introduction to the WAJAP and the methodology used in the field to record and collect the data. The chapter will conclude with a discussion on the dataset itself, explaining which sites were selected for the current study as well as the criteria used for the selection.

3.1 Sohar and its hinterland

The study area of the WAJAP, the region around the city of Sohar, can be divided into four principal environmental zones. Firstly, the foothills and wadi entrances at the back of the plain, against the Hajar Mountains. Secondly, a 10-50 km wide zone of alluvial gravel and sand called the *bajada*. Thirdly the four to five km wide strip of cultivated, alluvial zone that runs along the plain behind the coastal sand dunes and is referred to as the Lower Batinah. It is on this environmental zone that modern day agriculture is primarily focused. Finally there is the coast itself with sabkhas flats, coastal sand dunes and the beach (fig. 16).
Each of these environmental zones offers different opportunities to human settlement, which in turn have resulted in different types of occupation. For example, whereas the wadis can provide floodwater and *falaj* irrigation, the bajada is generally unsuitable for retaining standing water and groundwater remains too deep for effective extraction. Therefore a higher density of human occupation can be expected along the wadis, than on the bajada.

The region around Sohar is of historical importance, going back at least to the start of the third millennium BC (Costa and Wilkinson 1987, 14). There are several reasons for its importance. For one, the region holds one of the few natural corridors, the Wadi al-Jizzi corridor, leading from the coast to the interior of the country. This route must have been of great importance to nomadic tribes, travelers and merchants throughout the ages (Düring and Olijdam 2015, 93). Secondly, the Wadi al-Jizzi catchment provides a steady recharge of the groundwater, which allowed the region to become one of the most fertile areas of Oman before the introduction of modern irrigation techniques (Costa and Wilkinson 1987, 14). Finally, the Hajar al Gharbi foothills, located behind the coastal plain, hold numerous copper deposits that have been mined as early as the third millennium BC (Costa and Wilkinson 1987).

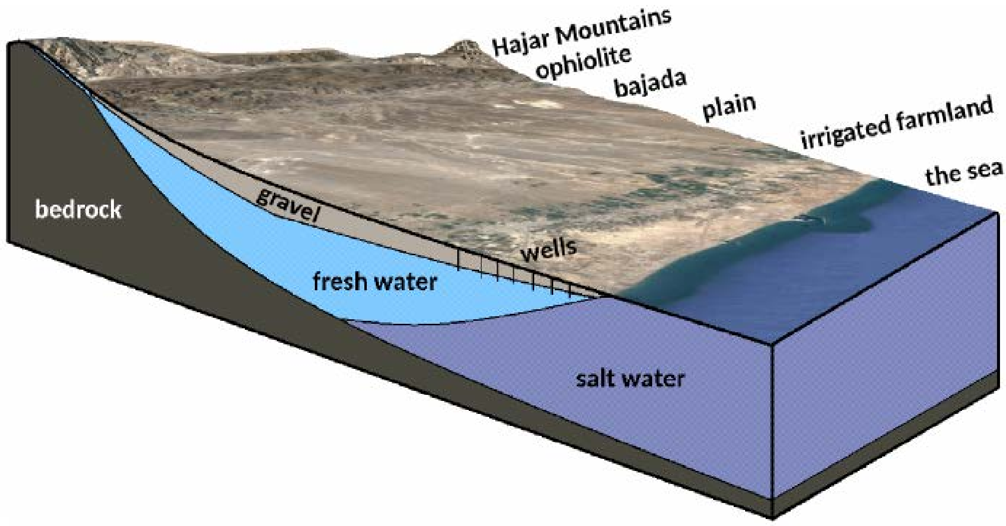


Figure 16. A cross-section of the different environmental zones present in the study area (Deadman 2017, 39).

3.2 Research history of the study area

The earliest investigation of archeological remains in the study area was conducted in the 19th century by Lieutenant-Colonel Miles on his journey from Sohar to Burami (Miles 1877 in Düring and Olijdam 2015). Miles not only describes the archeological features he encountered, but also elements of land-use along the Wadi al-Jizzi.

The first true archeological research project was conducted in 1958 by Phillips and Cleveland. This research unfortunately only produced a short report on some of the soundings that were conducted in the city of Sohar (Cleveland 1959). Archeological research in the region did not return until the 1970's and 1980's. In 1973 the Harvard Archeological survey identified several sites in the region, such as the multi-period site of Tell el-Sbul and the mining site of Arja (Düring and Olijdam 2015, 95; Humphries 1974). In 1972 and 1973 Frifelt excavated several prehistoric tombs in the Wadi Suq, which upon publication became the type-site for the Middle Bronze Age on the peninsula (Frifelt 1975). The German team under the direction of Weisgerber investigated copper mines and sites connected to metallurgy in the Wadi al-Jizzi and other parts of Oman in the late 1970s (Weisgerber 1977; 1978; 1983). This work proved to be of utmost importance as many of the mines and sites disappeared due to modern mining activities (Düring and Olijdam 2015, 95). The survey work conducted by Costa and Wilkinson on Sohar and its hinterland in the early 1980s was another important contribution to the archeology of the region (Costa and Wilkinson 1987). The results of their research was published as a whole volume of the *Journal of Oman* and discusses various aspects such as early Islamic agriculture, historic and prehistoric settlements of the region and the copper exploitation in the Arja region from the third millennium up until modern times.

After this period of intense research, very little work was conducted in this region of Oman. Several rescue excavation were conducted in 2010 and 2011 as part of the Sohar Heritage Project, but the results have yet to be published (Düring and Olijdam 2015, 95).

3.3 The Wadi al-Jizzi Archeological Project

The Wadi al-Jizzi Archaeological Project (WAJAP) is a systematic and multi-period survey conducted by Leiden University, which covers the hinterlands of Sohar from the Hajar al Gharbi foothills to the coastal plains of Sohar (fig. 17). The project commenced in 2014 and is ongoing. There are several reasons for re-starting archeological research in the Sohar region. First, previous research in the region mainly focused on the immediate area surrounding the modern-day city of Sohar and the copper mining site of Arja. As a result, a large number of prehistoric and historic sites between the mountains and the sea remain unexplored (Düring and Olijdam 2015, 95). Second, modern technologies such as remote sensing, GPS and the use of drones and photogrammetry allow the coverage of a much wider area. A large amount of information on burial structures, canals and field systems can be obtained and processed on the basis of remote-sensing such as Google Earth and Aster images (Düring and Olijdam

2015, 95-96). Many of these features are hardly visible when viewed from the ground level.
Finally, the WAJAP is also a rescue project as the archeology of the region is negatively affected by various modern processes, such as looting, modern mining operations, farming activities, infrastructural projects and the expansion of Sohar itself (Düring and Olijdam 2015, 96).

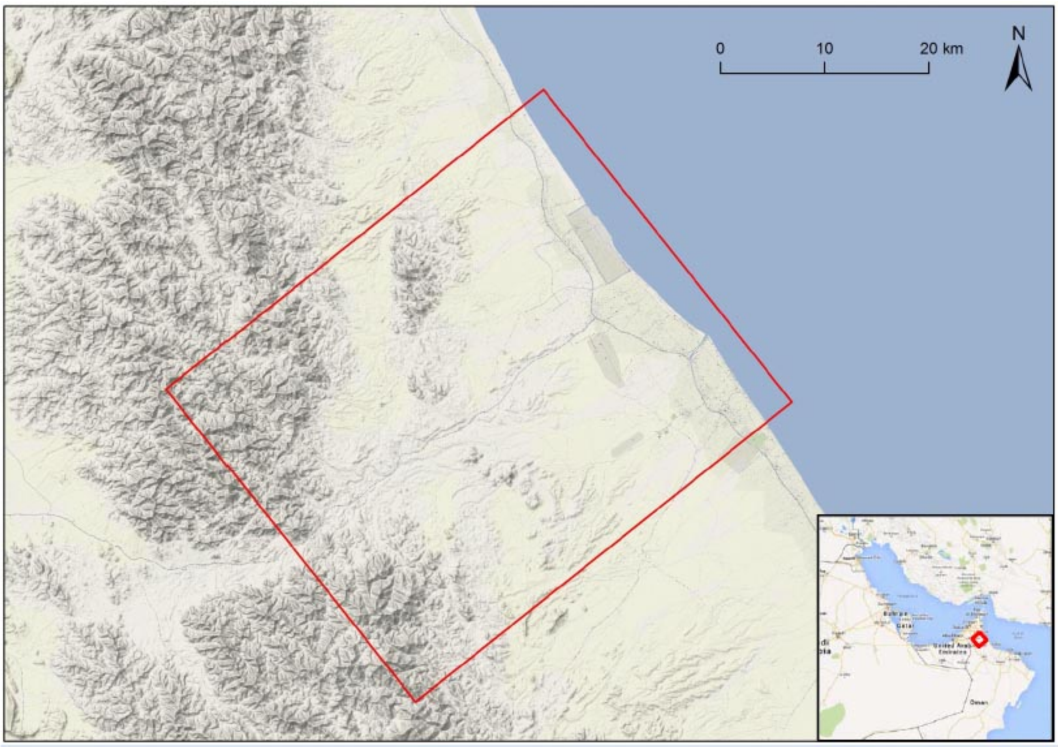


Figure 17. The area covered by the Wadi al-Jizzi Archaeological Project (after http://wajap.nl/?page_id=2).

Three thematic research questions are central to the WAJAP. The first research question concerns the landscapes of subsistence. How did people in the past obtain their daily food in the challenging landscape? How were subsistence strategies affected by ecological changes and agricultural innovations? The second research question focuses on the landscape of mining, investigating the physical remains of mining operations and how mining activities affected the local ecosystem. The third and final research question investigates landscapes of death. This simply means that the project is interested in the diversity in burial structures, their location in the landscape and the finds associated with these structures (Düring and Olijdam 2015).

3.4 Methodology of WAJAP

The methodology used to gather data in the WAJAP consists of several steps. The first step involves the use of remote-sensing, such as Google Earth, to locate potential archaeological structures. This step is soon followed by scouting the areas with high potential for archaeological remains. The scouting is a combination of driving through the areas, as well as walking trips on which some initial data can be gathered (such as sherds) in order to tentatively date the areas. The third step involves a pedestrian survey in which all archeological structures are documented, mapped, photographed and all the associated assemblages recorded and sampled. The documentation of the structures is done in Microsoft Access and on a Samsung tablet, in order to minimize paperwork as well as digitalizing the data on the spot. Within the Access form (fig. 18) there are several fields which need to be filled in:

- **SiteID:** Each of the sites within the WAJAP are assigned an unique, sequential number.
- **Team member:** The name of the person documenting the structure.
- **Date:** The date of documentation.
- **StructureID:** Each structure within each site is attributed with a unique, sequential number.
- **STCode:** This a unique code which is automatically generated by combing the SiteID and StructureID (for example S7ST31 for structure 31 at site 7).
- **Category:** There are five categories of structures in the WAJAP: ‘building’, ‘funerary monument’, ‘open structure’, ‘water management’ and ‘unknown’.
- **Type:** Within each category of structures, there are also different types. For example within the category of ‘funerary monuments’ there are four types: ‘(subterranean) tombs’, ‘cairns’, ‘cemeteries’ and ‘graves’.
- **Orientation:** The orientation of the structure (when possible).
- **Shape:** The shape of the structure.
- **Period:** The period in which the structure was constructed. For example: Hafit, Umm an-Nar, Wadi Suq, Early Islamic, etc.
- **Length:** The length of the structure measured in meters.

- **Width:** The width of the structure measured in meters.
- **Thickness:** The thickness of the walls of the structure measured in meters.
- **Building material:** The type of building material used in the construction. For example: 'unhewn', 'roughly hewn' or 'finely hewn building blocks' .
- **BM shape:** The shape of the building material. For example: 'rounded' or 'squared'.
- **Remarks:** This field is reserved for additional remarks which cannot be entered in the above mentioned fields. For example the level of preservation, a concentration of finds in a specific area, etc.

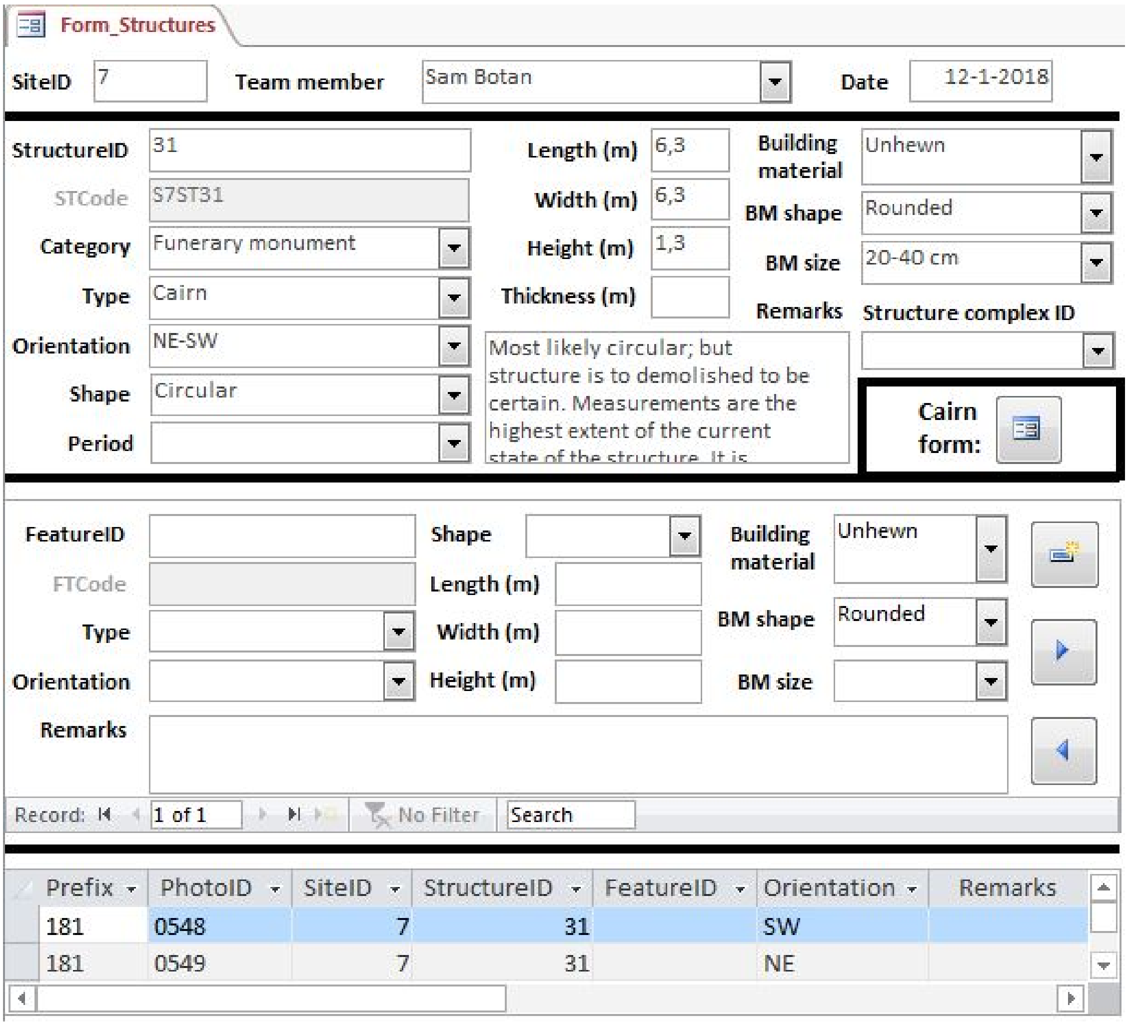


Figure 18. An example of the digital structure form used in the WAJAP (screenshot made by the author).

After entering data into all of the above mentioned fields, photographs would be taken of the structure from different angles. Each camera used in the project receives a specific and unique number (for example camera 181). The pictures taken would then be entered into the final fields:

- **Prefix:** The unique camera number. For example ‘181’, for camera 181.
- **PhotoID:** The photo number on that specific camera.
- **Orientation:** From which position the structure is photographed.

In the case of cairn-like structures (such as Hafit or Sasanian type tombs) an additional form must be filled in (fig. 19). This is done in order to further distinguish certain cairn-like funerary structures. The fields that are required are:

- **Class**: The class or type of cairn. There are six classes of cairns within WAJAP: dome, flat oval, large flat oval, raised concentric, terraced and tower.
- **Construction type**: The construction method used to create the cairn. This can either be aligned, piled, terraced or walled.
- **Location**: The location within the landscape on which the cairn is constructed. This can be on a hilltop, on a slope or in a wadi.
- **Context**: The context in which the cairn is found. This simply means whether the cairn is grouped, abuts another cairn, is agglutinated to another cairn or free standing.
- **Abutting**: If the cairn is abutting another cairn, the structure number of the other cairn needs to be recorded in this field.

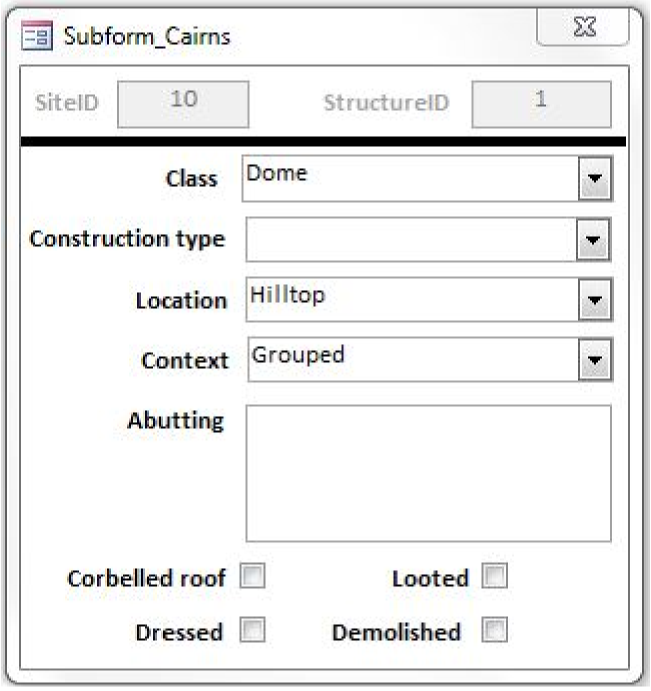


Figure 19. An example of the Cairn form used in the WAJAP

(screenshot made by the author).

At the very end of the form there are several boxes that can be checked in one or more of the accompanying descriptions are applicable to the cairn, such as the presence of a corbelled roof, whether the tomb is looted, whether it is completely demolished and whether the cairn has dressed stones (fig. 19).

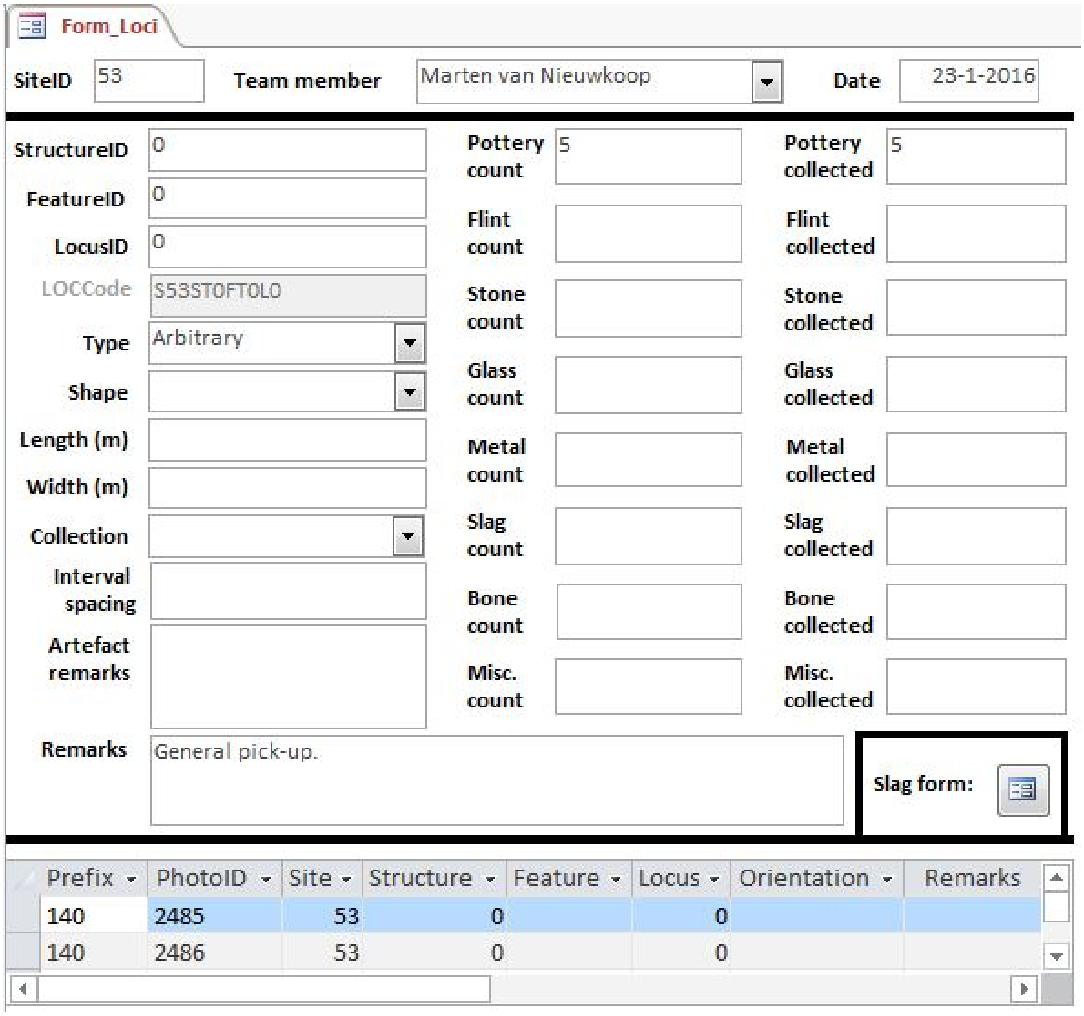
Finds are recorded following a slightly different procedure (fig. 20). All the finds are recorded by *locus* (plural *loci*). A locus can be described as a 3-dimensional area that defines the borders in which specific finds have been collected and/or evidence of human activity has been noted. Loci are labelled numerically. A number of factors can determine the border of a locus. For example:

- The presence of one or more architectural features, such as modern walls, modern roads, pits, ancient wells etc. This also means that the locus number will change when a new division of space is necessary. For example: when a modern wall cuts an ancient structure into two parts, the finds found on one side will receive a different locus number than those found on the opposite side.

- The border of a deposition. A different deposition can be found in an area that is already defined by a specific locus. For example: a shell-midden inside the targeted area may receive a different locus number, than the area around the midden.

Similar to the structure form, there are several fields that need to be filled in the locus form. The majority of the fields are similar to the structure form and the explanation of these field will not be repeated here. However there are several fields which are different from the structure form:

- **LOCCode**: This a unique code which is automatically generated by combining the SiteID, StructureID, FeatureID and LocusID.
- **Type**: Loci can be *defined* (for example separate rooms in a building) or *arbitrary* (in the case there are no clear natural or man-made divisions).
- **Collection**: The artifacts can be collected by doing a *full pick-up* (in which case all of the finds are collected) or by *interval* (in which case the surveyors walk in an interval and only collect the artifacts on their path).
- **Interval spacing**: In the case of an interval collection (see above), the distance between the surveyors needs to be recorded in this field.
- **Artefacts remarks**: This field is reserved for specific remarks on the artefacts, such as a concentration of artefacts in a specific corner of a room.



Prefix	PhotoID	Site	Structure	Feature	Locus	Orientation	Remarks
140	2485	53	0		0		
140	2486	53	0		0		

Figure 20. An example of the locus form used in the WAJAP to record the finds (screenshot made by the author).

Finally, for each of the artefact types (pottery, flint, stone, glass, metal, slag, bone and miscellaneous) the number of artefacts which have been counted needs to be filled in, as well as the number that are eventually collected and bagged. It must be noted that the counting of the artefacts is usually done by a tally counter and that these fields always need to be filled in, even when a full pick-up is done.
At the end of each season, all of these forms would be combined and stored as a single Microsoft Access database.

The WAJAP methodology for recording archaeological features and finds is clearly extensive and detailed. The WAJAP database is therefore very solid, as it does not allow individual team members to create their own classes or material categories and it thus minimizing the variability potential caused by inter-observer error.

Nonetheless, we must bear in mind that the data are still recorded by individuals with their own interpretation of the archaeological record. Different people with different archeological experiences tend to look at archeological features differently. This simply means that the shape of a tomb might look rather ‘oval’ to one, while another might find it more ‘circular’. Another problem is the overall dating of funerary structures. As discussed in Chapter 1, there are multiple tomb types in the WAJAP study area. Even though most of the tomb types can easily be distinguished (for example Umm an Nar and Wadi Suq tombs), that is not always the case when it comes to the cairn-like tombs of the Hafit, Iron Age and Sasanian period. In the case of disturbance (either by man or nature) a badly preserved Hafit tomb might look like an Iron Age cell-grave and vice versa. This point has already been mentioned in several publications (e.g. Saunders *et al.* 2015) in which Iron Age cell-graves had been initially identified as badly conserved Hafit tombs, only to be correctly identified as Iron Age tombs once they were excavated (Saunders *et al.* 2015, 189-193).

Naturally it would be impossible to excavate all of the 3000 funerary structures thus far documented by the WAJAP. However, it is important for the current study to create a set of criteria in order to easily select the Hafit tombs in the main database, as well as to minimize the error of selecting the wrong type of tombs.

3.5 Criteria for identifying Hafit type tombs

As discussed in Chapter 1, minor differences do exist among Hafit tombs. However, the similarities do exceed the differences. These similarities can be summarized as:

- Hafit tombs are collective above-ground burial structures made of unworked, locally available stones.
- Hafit tombs are built in a circular manner with one or several courses of corbelled walls, which in turn create a rough dome/tower-like structure over the burial.
- Hafit tombs are located on highly visible locations such as on ridges or low foothills.
- Hafit tombs have an average diameter of 4-5 meters. With a minimum diameter of 3 meters.

All of these aspects have been recorded in the field by the WAJAP and therefore can be used as criteria to filter and select Hafit tombs in the main Access database of the project. It is important to note that what sets the Hafit tombs apart from any other type of tombs is their shape, their diameter and the fact that they are their walls are not connected to any other structure (contrary to honeycomb tombs for example).
Thus, to summarize the criteria, the following tombs will be selected in the database to be used in the current study:

- Above ground tombs that have been identified as **'Cairn'**.
- Cairns that are made of unworked stones.
- Cairns that have been documented as being round in shape.
- Cairns that have a minimum diameter of 3 meters.
- Cairns that are located on a hilltop or slope.
- Cairns of which the **'Context'** is either free standing or grouped.

The reason for not selecting a maximum diameter for the tombs, is because there is no clear maximum for these type of tombs. As stated in Chapter 1, there are several Hafit tombs recorded in other parts of the Oman peninsula with a height of eight meters and a diameter of over ten meters. Therefore, it is very well possible

that such large examples could also occur in current study region.
Once we apply these criteria on the project's database we are left with total of 283 tombs spread over 35 different sites (tab. 1). However, caution must be taken as the number of 283 represents not the *actual* number of Hafit tombs, but rather the quantity which *most likely* represents the actual number of Hafit tombs. As stated previously, excavation is the only method which can firmly confirm the type of tomb. As excavating all of the 283 tombs would be practically impossible, it is the opinion of the author that the criteria given above can help us to render the number of Hafit tombs as close as possible to the actual number.

Examining the table, the most obvious observation is the fact that certain sites have a clearly higher number of tombs tentatively identified as Hafit, compared to other sites which only yield one or two. Site 58 for example has 58 tombs which fall within the criteria, while site 9 has only one. Comparing and analyzing all of these sites would not be a meaningful exercise, as it would be difficult to interpret the results generated by a site with only two tombs and comparing that site with the results of site with 58 tombs. It would be more meaningful to compare those sites with an above average number of tombs and thus could be tentatively be interpreted as Hafit *cemeteries*. This point becomes even more significant when we need to conduct site-to-site comparisons (see Chapter 4.2 and 4.3). Thus we need first to establish the average number of tombs, which is done by dividing the total number of tombs (283) by the number of sites which fall under the criteria (35). This leaves us with an average of 8.08 tombs per site (tab. 2).

However, this is not the final number of Hafit tombs which will be used as dataset. Sites 66 and 76 need to be eliminated from the list. Site 66 is a transitional site between the Umm an Nar and Wadi Suq periods (see Chapter 1) with primarily Wadi Suq tombs (Düring *et al.* forthcoming). The reason these tombs show up in the query, despite the criteria, is because they have been recorded in the field as "Cairns" even though they are subterranean tombs (authors personal observation). Site 76 on the other hand has been documented and analyzed as a cemetery of the Sasanian period in a separate study (Weijgertse 2018). It is plausible that several Hafit tombs exist on site 76 and other tombs were added in the Sasanian era. This would explain why the site was displayed in the results of the query. However, it seems more logical that we are dealing here with badly preserved Sasanian tombs, which may have been misinterpreted as Hafit. This notion becomes more convincing if we consider that, according to the WAJAP database, a total number of 190 tombs were recorded on the site and none has been clearly labeled as Hafit.

Table 1. The number of tombs falling within the criteria, with their corresponding site number.

Site	Number of tombs within the criteria
3	4
4	31
5	18
6	13
7	1
9	1
11	4
17	1
23	2
24	7
32	1
33	1
35	1
36	5
37	2
39	3
40	5
41	4
42	1
43	29
50	2
51	6
53	5
58	58
62	9
63	3
64	3
66	29
76	15
77	4
78	5
79	2
81	1
82	3
83	4
Total	**283**

Table 2. The sites with an above average number of Hafit tombs.

Site	Number of tombs within the criteria
4	31
5	18
6	13
43	29
58	58
62	9
66	29
76	15
Total	**202**

Thus after excluding both sites the final number of tombs used as a dataset is 158. One final point worth noting, is the fact that hardly any finds have been found associated with the tombs that fall within the criteria and those found are of a more recent period (tab 3). As discussed in Chapter 1, the Hafit tombs are characterized by a scarcity of finds, even when excavated. This is partly due to the fact that no local pottery was produced and pottery had to be imported from Mesopotamia, making it a rare and perhaps even a luxury item (see Chapter 1). Local pottery production in the region starts much later in the Umm an Nar period (2500-2000 BC). It is (partly) due to this reason that tombs of the Umm an Nar and later periods generally yield far larger quantities of finds, in comparison with Hafit tombs. This does not mean that tombs without finds can automatically be labeled as Hafit. However, it does seem to support the notion that the 158 tombs in question are correctly identified as Hafit tombs.

Table 3. Number of tombs associated with finds for each of the identified Hafit sites.

Site	Number of tombs identified	Number of tombs associated with finds	Type of finds
4	31	6	Flints and Islamic pottery
5	18	1	Islamic coins
6	13	1	Islamic pottery
43	29	3	Flints and Islamic pottery
58	58	5	Glass and Sasanian pottery
62	9	1	Islamic pottery

Conclusion

In this chapter a brief overview of the landscape and previous research conducted in the study region was provided. The aims and methodology of the Wadi al-Jizzi Archaeological Project, in which the dataset for the current thesis was generated, has also been discussed in depth. Finally, the chapter also discussed in detail the criteria used to identify Hafit tombs in the WAJAP database. To summarize these criteria once more, Hafit tombs are:

- Above ground tombs that have been identified as 'Cairn'.
- Cairns that are made of unworked stones.
- Cairns that have been documented as being round in shape.
- Cairns that have a minimum diameter of 3 meters.
- Cairns that are located on a hilltop or slope.
- Cairns of which the 'Context' is either free standing or grouped.

Once these criteria were applied to the WAJAP database a total of 283 (possible) Hafit tombs were identified. However, in order to have quantitative comparison, it was decided to only use those sites with an above average number of tombs as a dataset. This resulted in the removal of several sites and reducing the number down to 202 tombs. Yet, this was not the final number of tombs, as two more sites had to be removed from the list. Site 66 was removed due to it being a transitional site between the Umm an Nar and Wadi Suq periods. Site 76 had also to be removed from the list as this site is a Sasanian cemetery. In the end the final number of tombs which will be used as a dataset is a total of 158 tombs.

Chapter 4: Spatial Analysis

A Geographic Information System (GIS) is a package of various computer systems used to create maps for a variety of descriptive analytic purposes. Since its development in the 1980's, GIS has become an important and powerful tool in archaeology. The power of GIS lies in its ability to help analysists to 'visualize' the data, in order to better understand patterns and concentrations of specific phenomena (Jardine and Teodorescu 2003, 6). GIS has also the ability to help uncover spatial relationships between different sets of data, by portraying different layers of information.

4.1 Using GIS on the WAJAP data

In the Wadi al-Jizzi Archaeological Project (WAJAP) the location of all man-made structures were documented in the field with help of a GPS device. The devices would provide for an x- and y-coordinate for each structure and thus determining their geographical location. It must be noted though that the GPS devices used in the project had a standard deviation of four meters. The data from the GPS devices would then subsequently be transferred to a GIS and stored per site.

Before we can start with the analysis of the Hafit tombs, we will need first to combine the spatial data of the main sites (see previous chapter) into a single database. The program used for this is ArcGis version 10.2.2. provided by Esri. All the spatial data of sites 4, 5, 6, 43, 58 and 62 were added to the program using the **'Add data'** function. The next step involves merging the six different datasets into a single layer. This achieved by using the **'Merge'** tool located under **'Geoprocessing'**. Once this step is completed, we are offered with a map displaying *all* of the tombs recorded at these sites.

The next step involves the joining of the spatial database in ArcGis with the main Access database of the project (see previous chapter). This is necessary as it will allow us to create parameters and set the requirements to identify Hafit tombs. To achieve the join we need to have an overlapping attribute/field in both datasets. The attribute/field of 'STCode' is present in both datasets with the same values and will thus be used to join both. By right-clicking the layer previously created with the **'Merge'**, we can open the **'Join data'** function (fig. 21). It is important to indicate that the overlapping attribute/field in both datasets is 'STCode'.

The final step is to define the Hafit tombs. As discussed in Chapter 1 there are several types of tombs in the study area and sometimes several different types occur on a single site. In Chapter 3 several criteria were created in order to separate the Hafit type tombs from all others.

These criteria can be translated as a query in ArcGis. By right-clicking each of the three layers separately we open the **'Properties'**. Within **'Properties'** we then select the **'Definition Query'** option (fig. 22). Once we have selected **'Definition Query'** we can enter the criteria for the Hafit type tombs (fig. 23). This is done by translating the criteria to Standard Query Language (SQL), which is the programming language for queries in ArcGis. For example, the first criteria is to only select those structures which have been selected as 'Cairn'. In SQL this translates to: "Structures.Type" = 'Cairn'. Once all the criteria are translated to SQL and put in the query for each layer (see fig. 23 for the full SQL code) we can apply it to the generate a map with only the Hafit type of tombs (fig. 24).

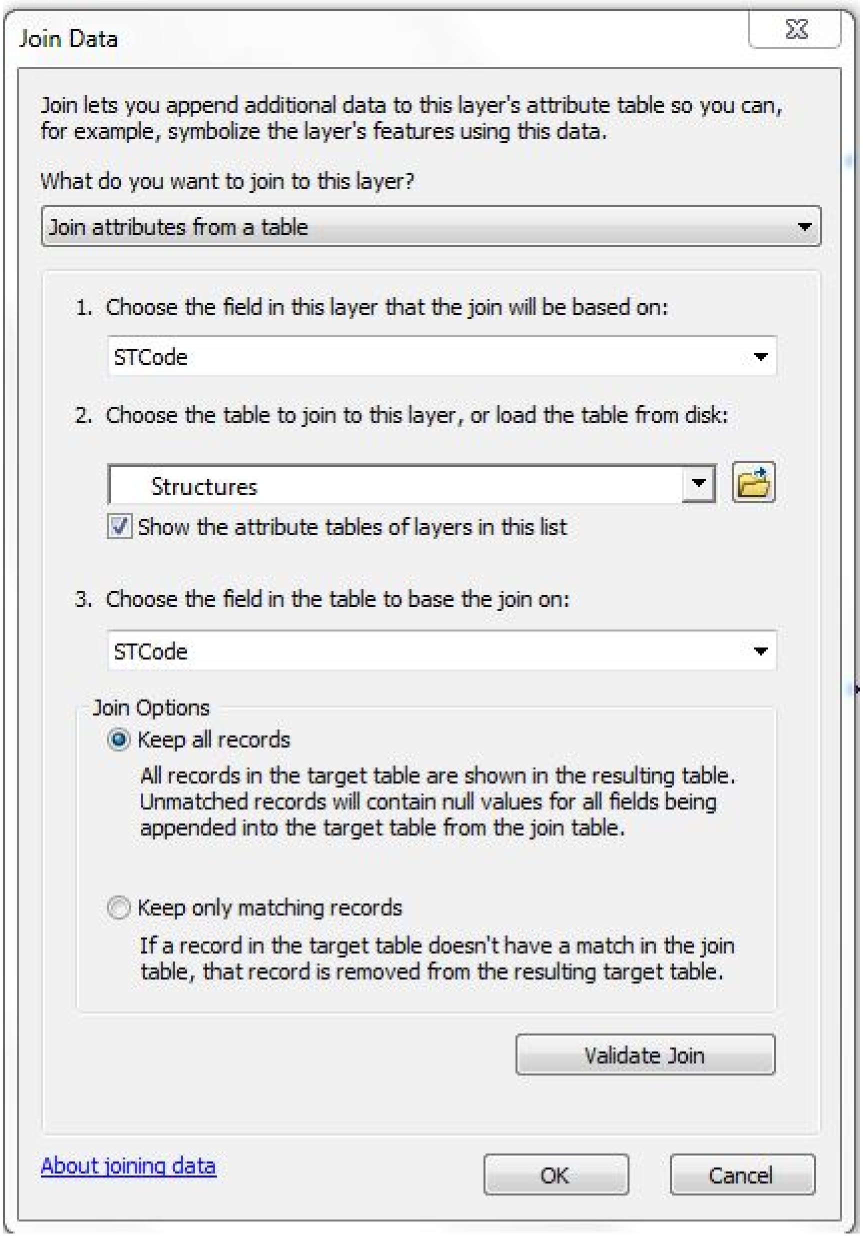


Figure 21. The **'Join data'** function used to join the data from the main Access database and the spatial dataset in ArcGis

(screenshot taken by author).

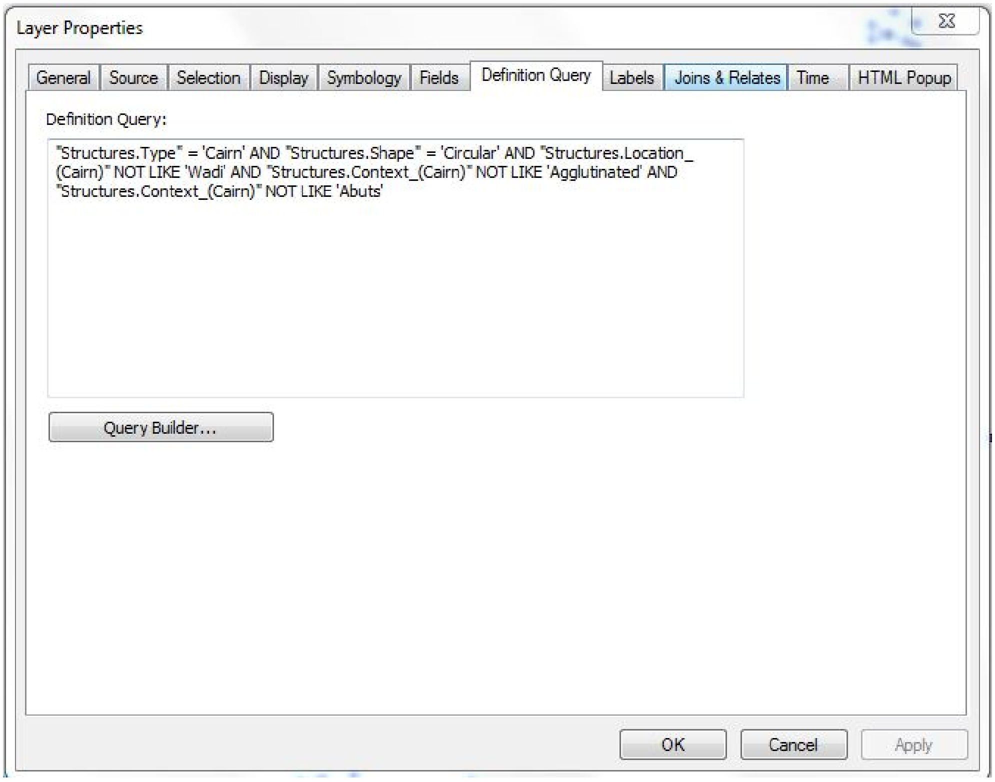


Figure 22. The available options when opening **'Properties'**

(screenshot taken by the author).

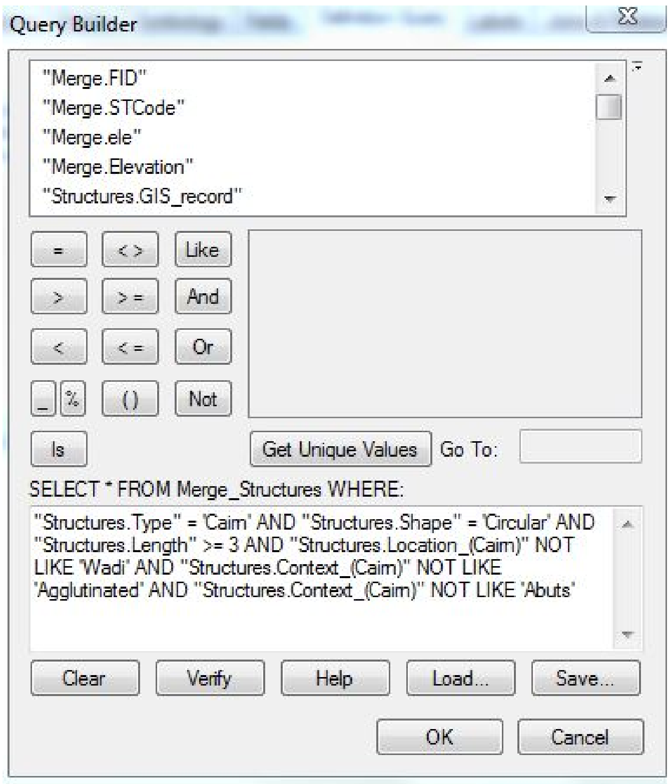


Figure 23. The query used to identify and select Hafit type tombs

(screenshot taken by the author).

Figure 24. Overview of the final map generated in ArcGis with all the Hafit type tombs in the study area

(map created by the author).

4.2 General distribution of the Hafit tombs

In the Introduction of this thesis, different sub-questions were proposed, which need to be answered first before we can answer the main research question. The first sub-question concerns itself with the general spatial distribution of the tombs (see Introduction).

Upon first examination of the map we can already make two observations. First, that five of the six significant sites with Hafit tombs are located around Wadi Suq instead of the bigger Wadi al-Jizzi; and only one site (S62) is located in the Wadi Fizh. Secondly, that the five Hafit sites around Wadi Suq seem to have been located more closely to the area known as the Lower Batinah (see Chapter 3) than towards the mountains.

However, in order to better visualize the spatial distribution of the tombs a density map is required. In ArcGis this is achieved by using the **'Point density'** tool, which is located in the ArchToolbox. The result is a heat map which indicates the density of the tombs within the research area (figs. 25 and 26). When we analyze the heat map generated by the **'Point density'** tool we can observe several aspects. First, that the Hafit tombs around the northern bank of the Wadi Suq display several high density clusters which are closely packed, while the density clusters on the southern bank of the same wadi are more evenly spread (fig 25). Second, that the density of these tombs seem to increases towards the Lower Batinah. Third, that the density of Hafit tombs in the Wadi Fizh (S62) seems to mimic the density also witnessed on the northern bank of the Wadi Suq (figs. 25 and 26).

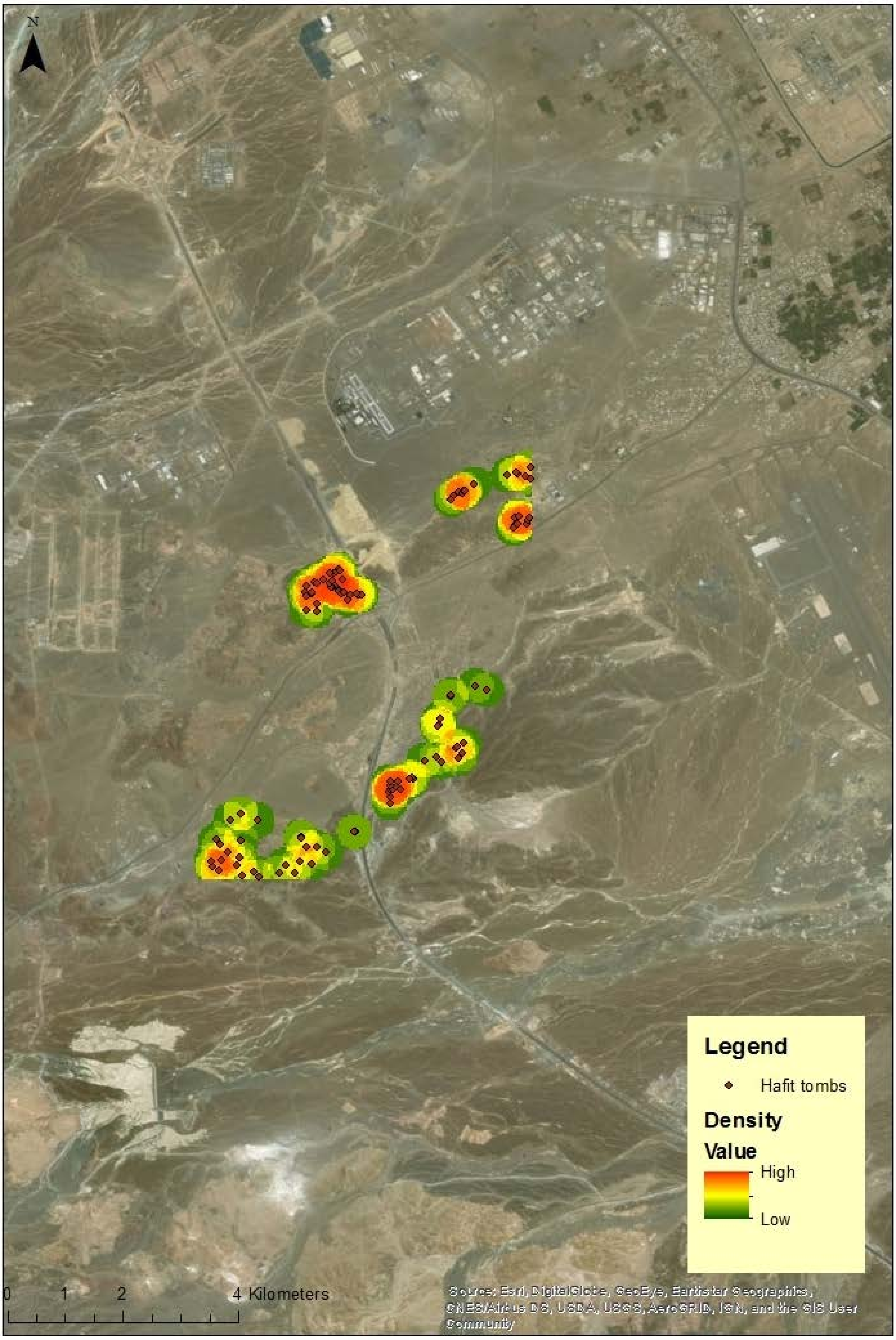


Figure 25. Heat map displaying the density of the Hafit tombs around the Wadi Suq (map created by the author).

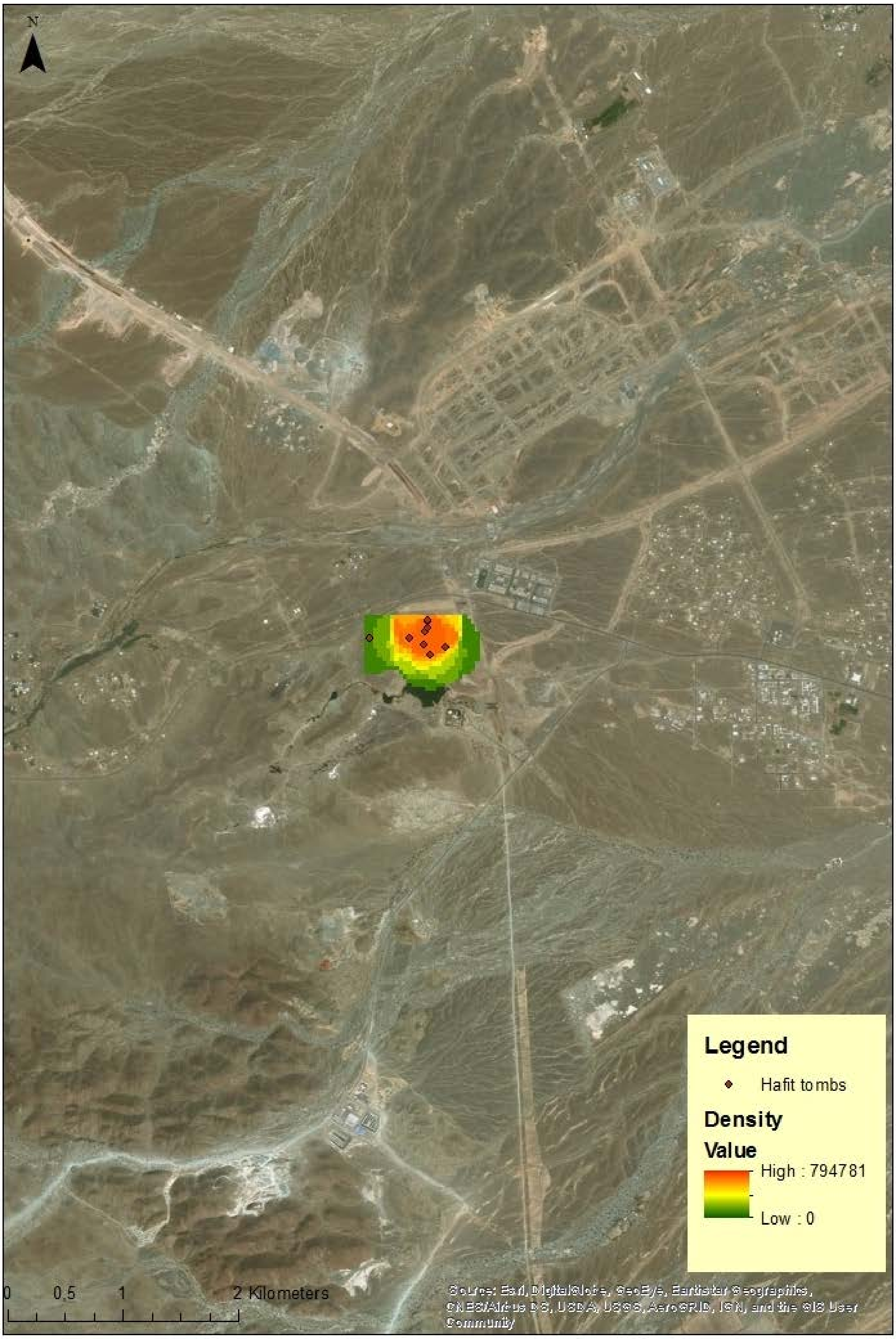


Figure 26. Heat map displaying the density of the Hafit tombs around the Wadi Fizh

(map created by the author).

Nonetheless, the pattern that emerges from this analysis is significant, as it seems to indicate the existence of several, distinct clusters which in turn might indicate specific cemeteries. Furthermore, the pattern visible in the density analysis is very similar to the pattern observed by Deadman for the whole Batinah (Deadman 2017, 249-274). As discussed in Chapter 2, Deadman focused in his PhD not only on Hafit tombs, but also the so-called Late Prehistoric Tombs (LPT's). His study showed that compared to LTP clusters, clusters of Hafit tombs usually consist of a single structure, contain tombs that are rather distant from one another and cover a small area (fig. 27). He also noticed that LPTs are often found in close proximity to large numbers of Hafit tombs, usually overlapping Hafit cemetery space (Deadman 2017, 253-261). When we take a closer look on the density clusters around the Wadi Suq, we can observe a similar pattern. The majority of clusters around the Wadi Suq are very similar to the Hafit clusters observed by Deadman, yet there are several cluster which display more similarities with LPT clusters instead of Hafit clusters (fig. 28). Site 43, located on the northern bank, is of special interest as the majority of the tombs seem to be clustered like LPT clusters, while the opposite is true for Site 5 located on the southern bank.

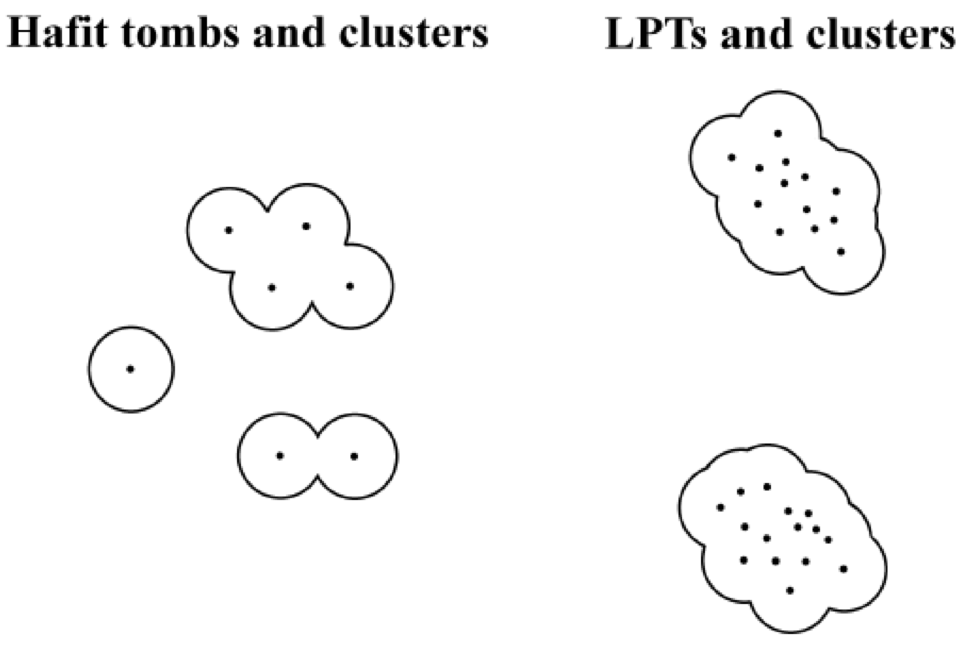


Figure 27. Differences between Hafit clusters and LPT clusters, as observed by Deadman (after Deadman 2017, 255).

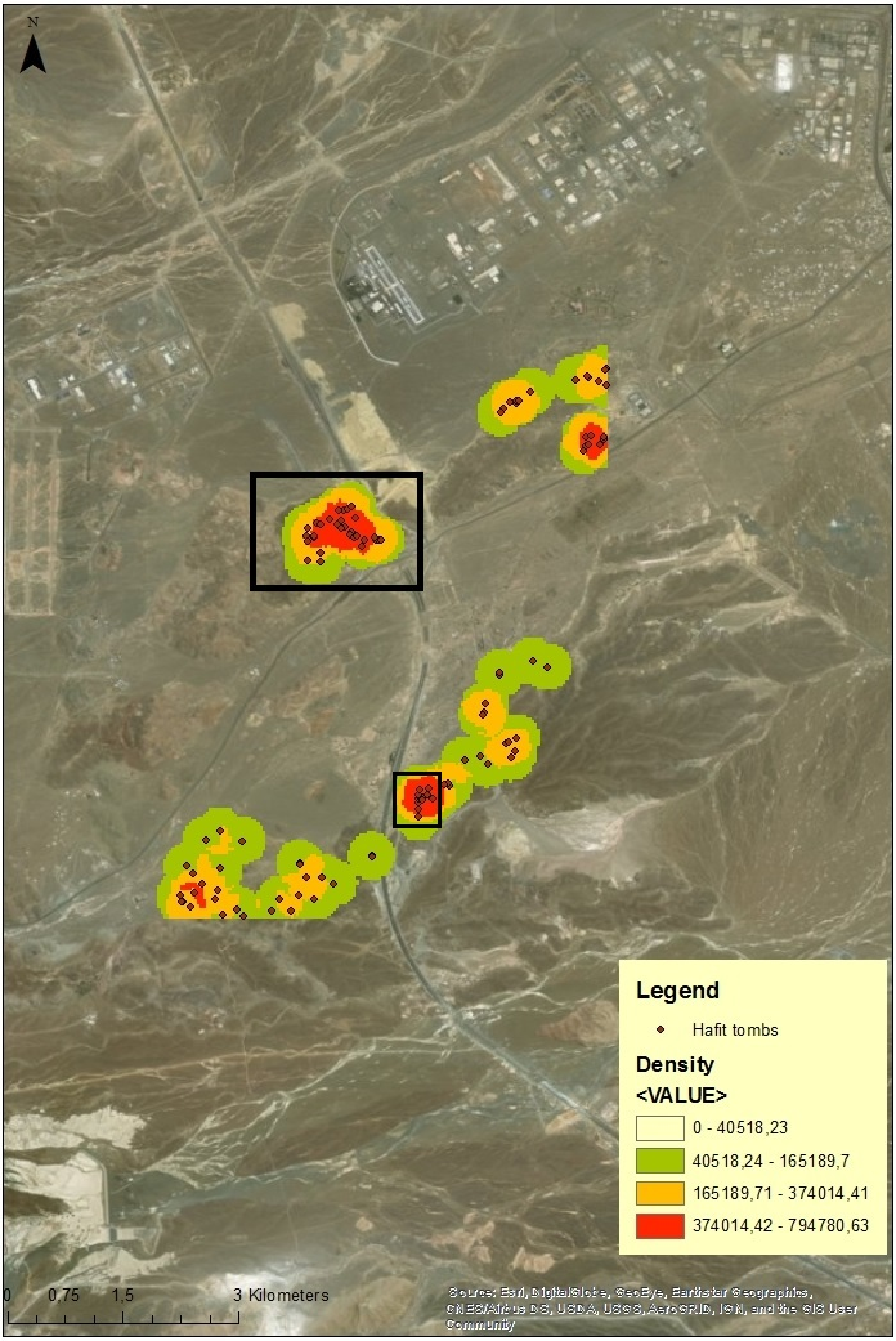


Figure 28. Close up of the density clusters around Wadi Suq, with the LPT clusters marked in the black boxes

(map created by the author).

4.3 Orientation of the Hafit tombs

The second sub-question of the current thesis focused on a theory proposed by Deadman, regarding the orientation of Hafit tombs. Deadman's research has been discussed in detail in Chapter 2. To summarize the theory, in the region of Wadi Andam there exists a clear coloration between the orientation of the entrances of Hafit tombs and the annual variation in the position of the sunrise. This seems to suggest that the sun, or rather the path of the sun, played an important role in Hafit funerary customs (Deadman 2014). In order to verify this theory, we have to compare the data from the eight Hafit sites of the WAJAP, with Deadman's results.
As discussed in Chapter 3, the orientation of each is tomb is recorded in the field with a compass. The orientation of the tombs is based on the orientation of the entrances, as Hafit tombs are circular in their plan. The first step is to compare the 'entrance survival rate' of the WAJAP tombs with those from the Wadi Adam. This simply means that we are comparing the percentage of tombs with a, more or less, preserved entrance. Table 4 presents the data from Deadman's study area, while table 5 presents the data from the WAJAP study area.

The first observation that can be made is that even though the number of Hafit tombs is much higher in the Wadi Andam, the entrance survival rate is significantly larger in the WAJAP study area. It must be stated though that not all of the WAJAP tombs clearly displayed a preserved entrance. The data presented in table 5 also includes those tombs of which the entrance collapsed, but its orientation could still be defined. Nonetheless, it is more likely that the WAJAP tombs are indeed much better preserved, as Deadman does mention the fact that some of the sites in the Wadi Andam were severely disturbed. The site of 'Uyun for example is now days used as a rubbish dump (Deadman 2014, 142). This would explain the very low entrance survival rate, even though over 200 Hafit tombs were recorded at the site.

Table 6 presents the orientation of the tomb entrances on the WAJAP sites. It is interesting to note that the data distribution is rather narrow. There are only four possible orientations for the WAJAP tombs: east/west, north/south, north-west/south-east and north-east/south-west. However, in order to analyze this data statistically we need to convert the absolute values into percentages. Once we have completed this step (fig. 29) it becomes clear that there is one single orientation that stands out. Half of the entrances of the WAJAP tombs are orientated towards the north-east/south-west, while 25 % are orientated east-west. The other two groups have roughly the same percentages, as 14% of the tombs are orientated north-south and 11% are orientated north-west/south-east.

The final step involves comparing the data from figure 29 with the annual variation in the azimuth of the sunrise for the Wadi al-Jizzi. The azimuth is the angle on which an astronomical object (such as the sun) relates to the horizon and is usually measured in degrees. The north equals 0°, east 90°, south 180°and west 270°. Contrary to Deadman, the current author used a different online application to calculate the annual variation in the azimuth (http://www.wx-now.com/Sunrise/Sunrise?place_id=57348). It is important to note that the city of Sohar was used as closest location to calculate the azimuth. The orientation of the two largest groups seems to coincide with the variation in the azimuth of the sunrise between the months of June and September for the Sohar region, which varies between 63.8° (east-north-east) and 87.1° (east).

Table 4. The number of Hafit tombs in Wadi Andam recorded by Deadman and the entrance survival rate

(after Deadman 2014, 142).

Site	Tombs Recorded	Preserved Entrances	Entrance Survival
Fulayj	58	15	26%
Khashbah	74	11	15%
'Uyun	207	16	8%

Table 5. The number of Hafit tombs in the WAJAP study area and the entrance survival rate (ESR).

Site	Number of tombs	Preserved entrances	ERS
4	31	21	68%
5	18	8	44%
6	13	6	46%
43	29	13	45%
58	58	36	62%
62	9	6	67%

Table 6. The orientation of tomb entrances per site in the WAJAP study area.

Site/Orientation	NE-SW	NW-SE	E-W	N-S	Total
4	16	3	2	0	21
5	4	1	3	0	8
6	2	2	1	1	6
43	11	0	1	1	13
58	10	4	12	10	36
62	2	0	3	1	6
Total	45	10	22	13	90

These results are of significance for several reasons. First of all, the orientation of the WAJAP tombs seem to support Deadman's theory that the sun must have played an important role in Hafit funerary customs. Second, the fact that the orientation of the two largest groups matches the azimuth of the sunrise between the months of June and September seems to suggest, according to Deadman's reasoning, that the tombs were constructed in this time-period. According to Deadman's theory, this would in turn indicate that the Hafit population living in the study area would have been a nomadic population, travelling back and forth between the tomb sites and other locations. Who, most likely, spent the summer period on the plains and the winter months elsewhere (Deadman 2014, 146). If the Hafit population in the WAJAP study area would have been sedentary, we would have witnessed a more even spread of the orientation of the tombs, rather than a focus on the north-east/south-west and east/west.

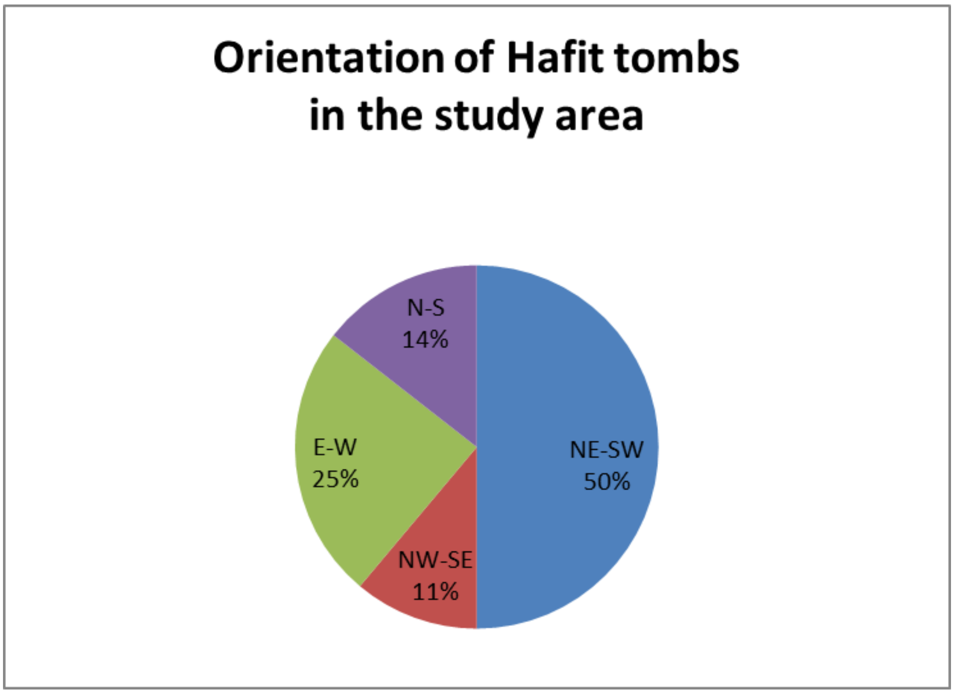


Figure 29. The orientation of the WAJAP tombs displayed as percentages.

Another aspect worth exploring is how the orientation of the tombs compare site-by-site. In Deadman's research, the tombs at Fulay and Khashbah were orientated slightly different compared to the ones located at 'Uyun (Deadman 2014). The orientation of the tombs at Fulay and Khashbah were more closely matched to the sunrise azimuth for the autumn/winter months; while the 'Uyun tombs were more comparable to the spring/summer months (Deadman 2014, 146). In this regard it would be worthwhile to explore the existence of similar patterns in the WAJAP data. Figure 30 displays the orientation of the WAJAP tombs as percentages per site. It is clear from the graph that certain sites are dominated by a single orientation, while others have a more evenly distribution. Sites 4, 5, 43 and 62 compliment the main pattern discussed previously (fig. 29). However, there are several sites that do not seem to 'fit' the general picture.

The tombs at sites 6 and 58 display a more even distribution when it comes to their orientation. So how can we explain this discrepancy?

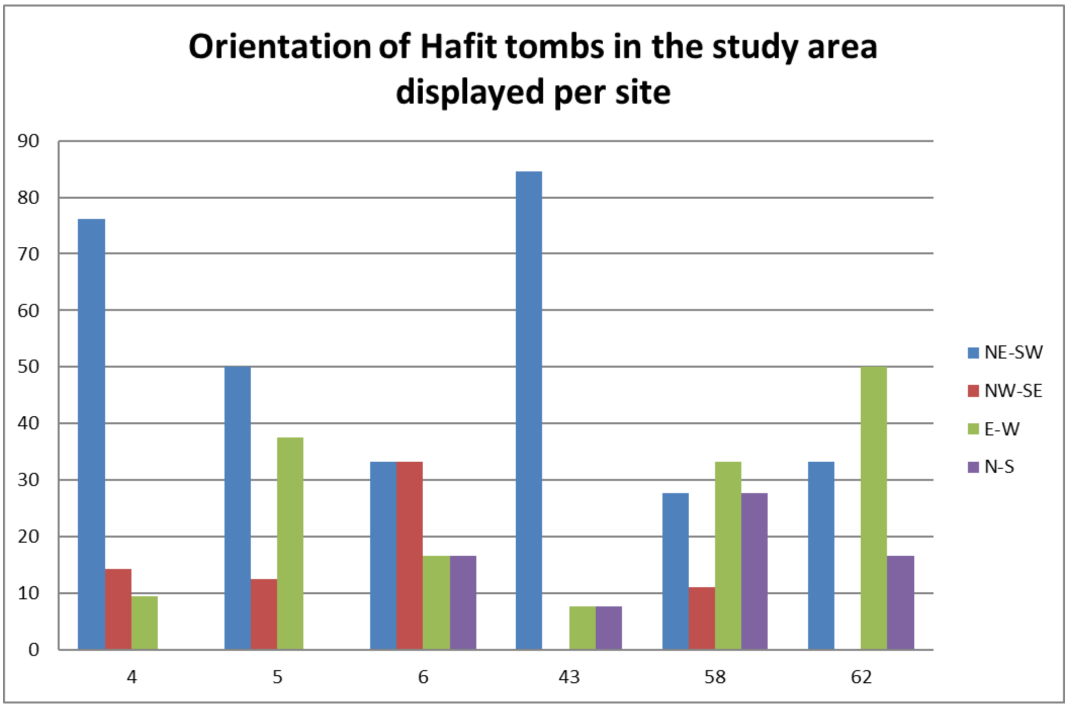


Figure 30. The orientation of the WAJAP tombs per site, displayed as percentages for each site.

Considering the previous discussion on the overall tomb orientation, one possible explanation is that we are dealing with tombs which have been constructed in the spring/summer months and those which have been constructed in the autumn/winter months, similar to the situation in the Wadi Andam. Using the same online application as discussed previously, we can calculate the azimuth of the sunrise for the winter months in the WAJAP study area. The azimuth for the period between November and March, which is the winter/rain season in the region, varies between 109,9° (east-south-east) and 103,6° (east-south-east). None of the sites display a clear orientation towards the azimuth for the winter season. So if we are not dealing with the construction of the tombs in two different periods, how can we explain the discrepancy? At this point it is not possible to give a satisfying answer. The only information we can gather from the site-to-site analysis, is that figure 30 clearly argues against the notion that the orientation of Hafit tombs was connected to the movement of the sun as two of the Hafit 'cemeteries' in the study area display a different preference for tomb orientation.

4.4 The correlation between Hafit tombs and the wadi systems

The third sub-question focusses on the correlation between Hafit tombs and the wadi systems. Some of the hypotheses discussed in Chapter 2, have argued for a correlation between the wadi systems in Oman and the movement of Hafit populations. Deadman and al-Jahwari for example, have argued that the Hafit tombs located in the Ja'alan and Wadi Adam regions were concentrated around wadis with large catchments and date-palm groves (Deadman 2012; Al-Jahwari 2013). To asses these theories we need to analyze the relationship between the spatial distribution of the Hafit tombs and the wadi systems in the study area.

In order to perform this analysis in Arcgis we need a raster file of all the wadi systems present in Oman and we need to calculate the proximity of the Hafit tombs to a wadi system. ESRI has open source hydrology provided by the World Wildlife Fund (WWF) called HydroSHEDS. HydroSHEDS is a raster map freely available by ESRI and offers geo-referenced data sets (vector and raster), including stream networks, watershed boundaries, drainage directions, and ancillary data layers such as flow accumulations, distances, and river topology information. To determine the relative distance between the Hafit tombs and the closest wadi system we will need to use the **'Buffer'** tool, located in **'Spatial Analysis'**. The **'Buffer'** tool allows the creation of buffers at specific distances. For the current thesis it was decided to create three buffers. The first buffer represents a distance between 0 and 500 meters. The results of this analysis are represented in figure 31.

It becomes clear from the analysis that the majority of the tombs located around the Wadi Suq are within 500 meters distance of the wadi. This close proximity to a wadi seems to support the hypotheses, proposed by al-Jahwari and Deadman, that the wadi systems played an important role in the Hafit societies and used to travel between the coast and interior (see Chapter 2). However, several sites are located further away from a wadi. The tombs at sites 5 and 6 seem much further away from the same wadi. Site 62, located in the Wadi Fizh, is just barley outside the 500 meters buffer (fig 31). In order to better understand this discrepancy two more buffers were created for the tombs in the study area, with distances of 1000 and 1500 meters. The results are presented in figures 32 and 33. Only in figure 33 do all of the tombs in the study area correlate to a wadi. This simply means that all the tombs have an access to a wadi once we reach the threshold of 1500 meters.

So how do we explain this discrepancy? One possible explanation might be that the tombs at sites 5, 6 and 62 are further away from a wadi, because of their elevation. As discussed in Chapter 1, Hafit tombs are located on highly visible locations such as on ridges or low foothills. It is very well possible that in order to reach these highly visible locations, one has to travel further away from certain parts of the Wadi Suq and Wadi Fizh, thus creating a larger distance to the wadi system. Yet, when we plot the tombs on a Digital Elevation Model (DEM) we can see that this is not the case. The use of the DEM will be discussed in more detail in the next section, but for now it is important to notice that none of the sites display any significant difference in elevation (figs. 34 and 35). The DEM, furthermore, clearly shows that the Hafit population would have had ample space to build their tombs closer to the wadis and yet still be highly visible.
For now, all we can argue for is that there is a correlation between the Hafit tombs in the study area and the wadi systems. However, whether Hafit tombs are concentrated around areas with a large water catchment and date-palm groves (as proposed by Deadman and al-Jahwari for example) is still open for debate.

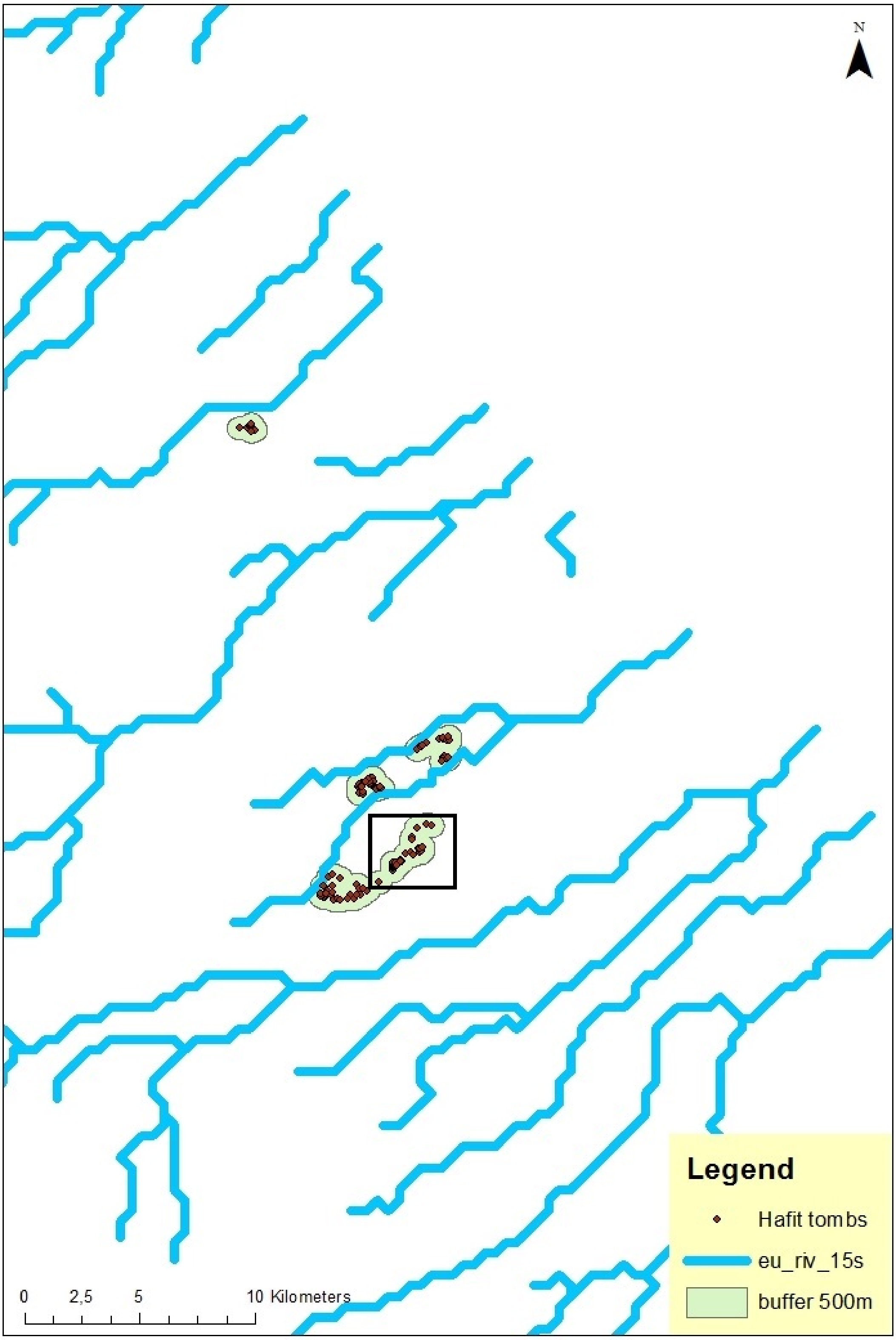


Figure 31. Map displaying the proximity of Hafit tombs to a wadi system up till 500m. Sites 5 and 6 are marked in the black box

(map created by the author).

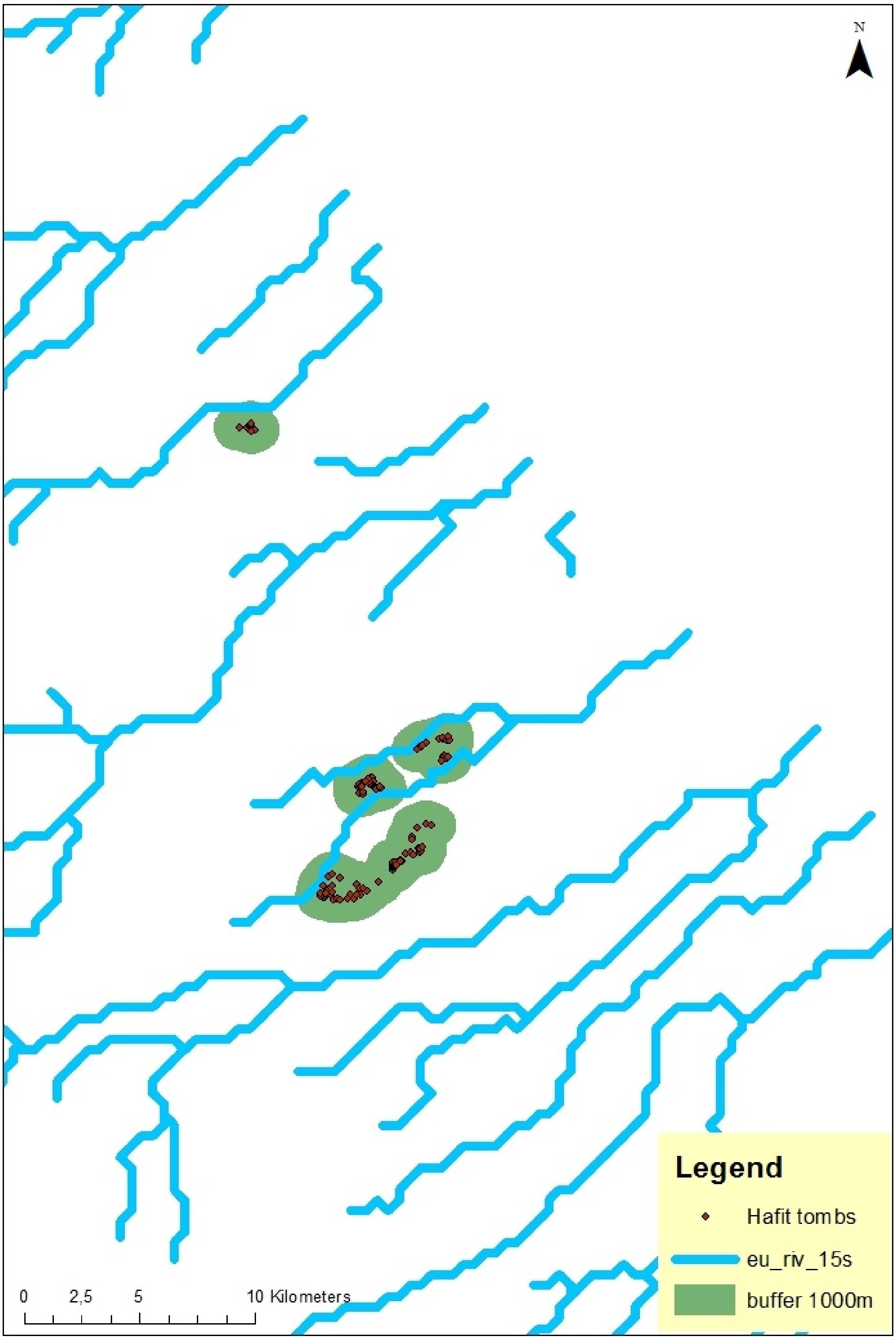


Figure 32. Map displaying the proximity of the Hafit tombs in the study area to a wadi system up to 1000m

(map created by the author).

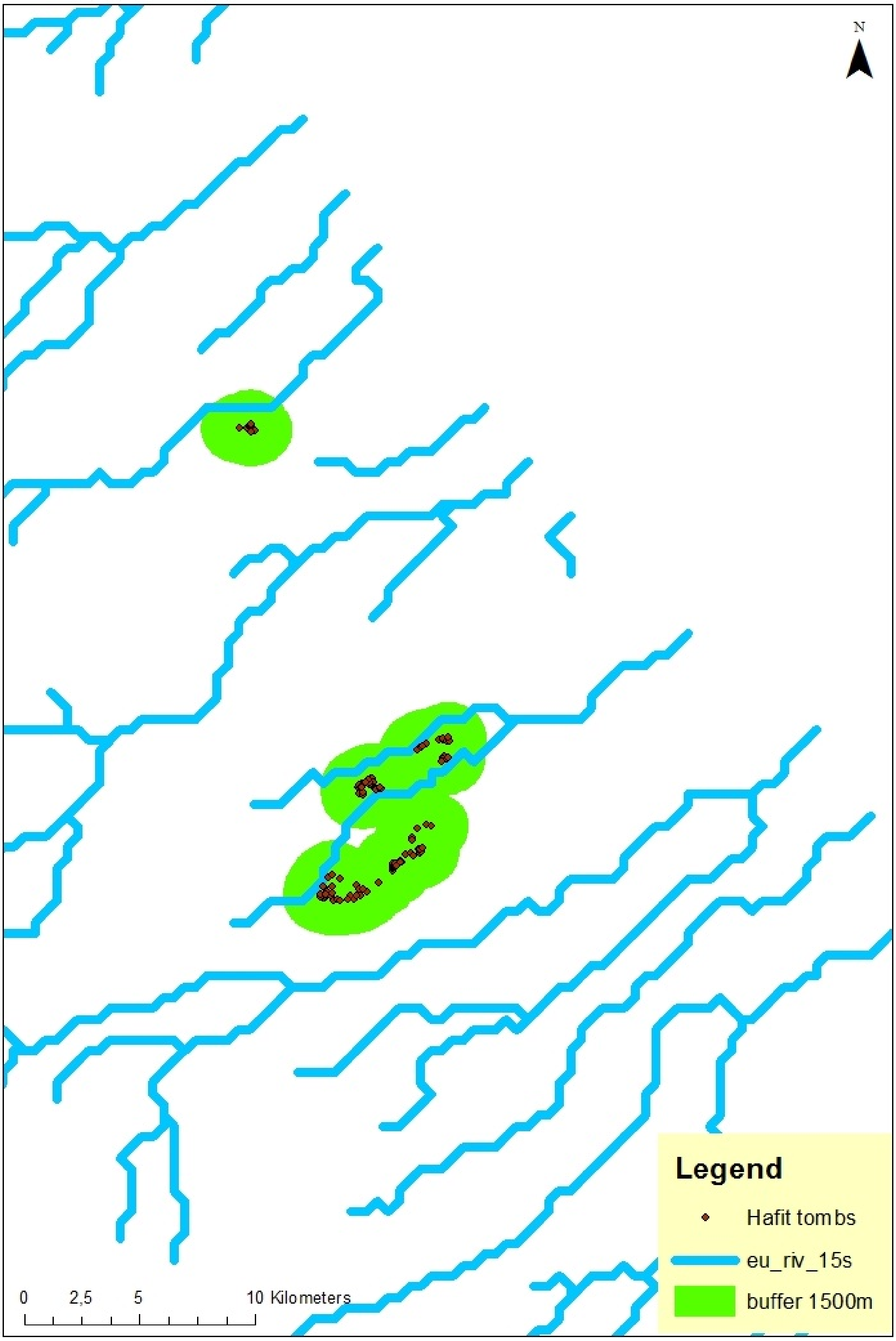


Figure 33. Map displaying the proximity of the Hafit tombs in the study area to a wadi system up to 1500m

(map created by the author).

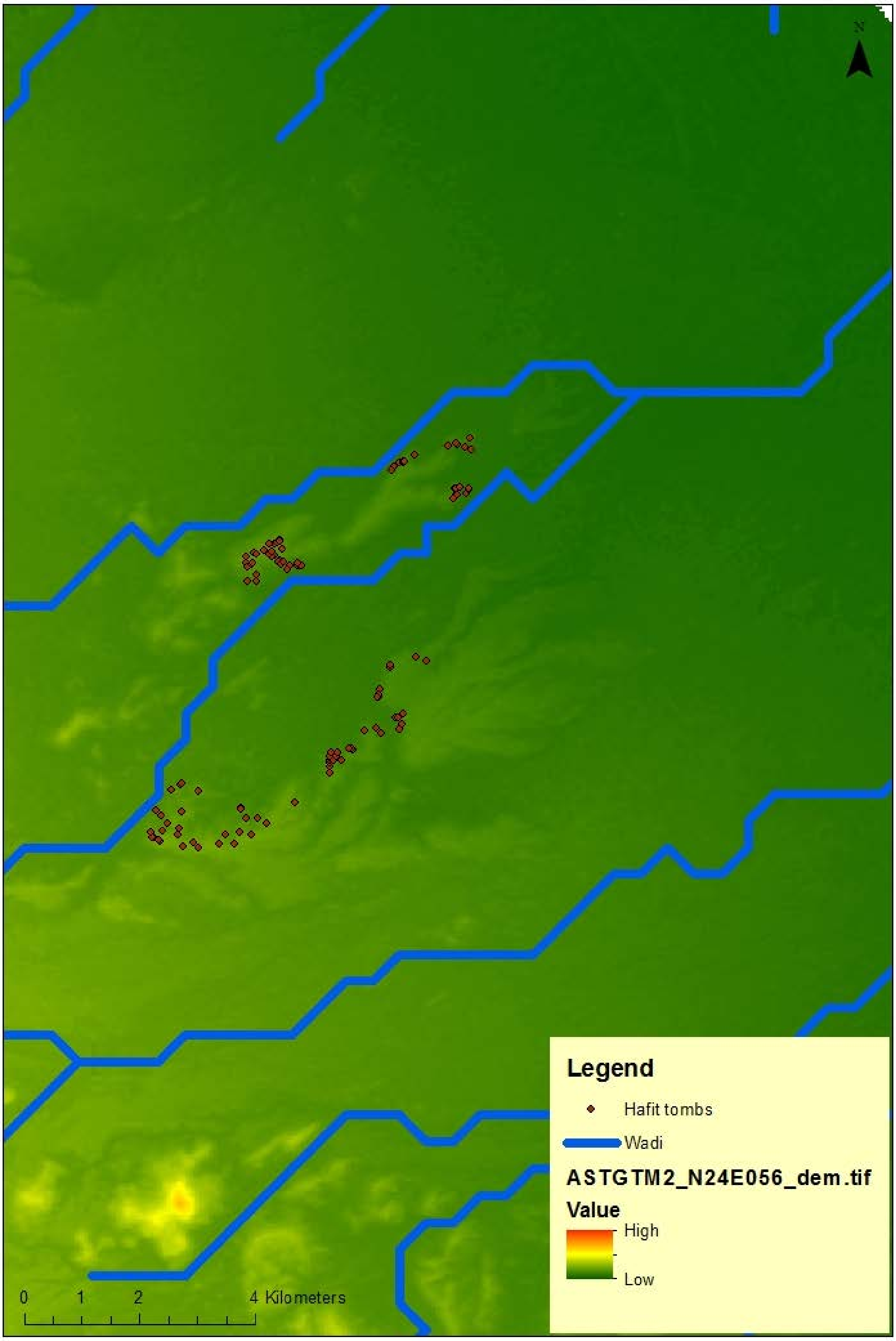


Figure 34. Digital Elavation Model (DEM) with the location of the tombs around Wadi Suq

(map created by the author).

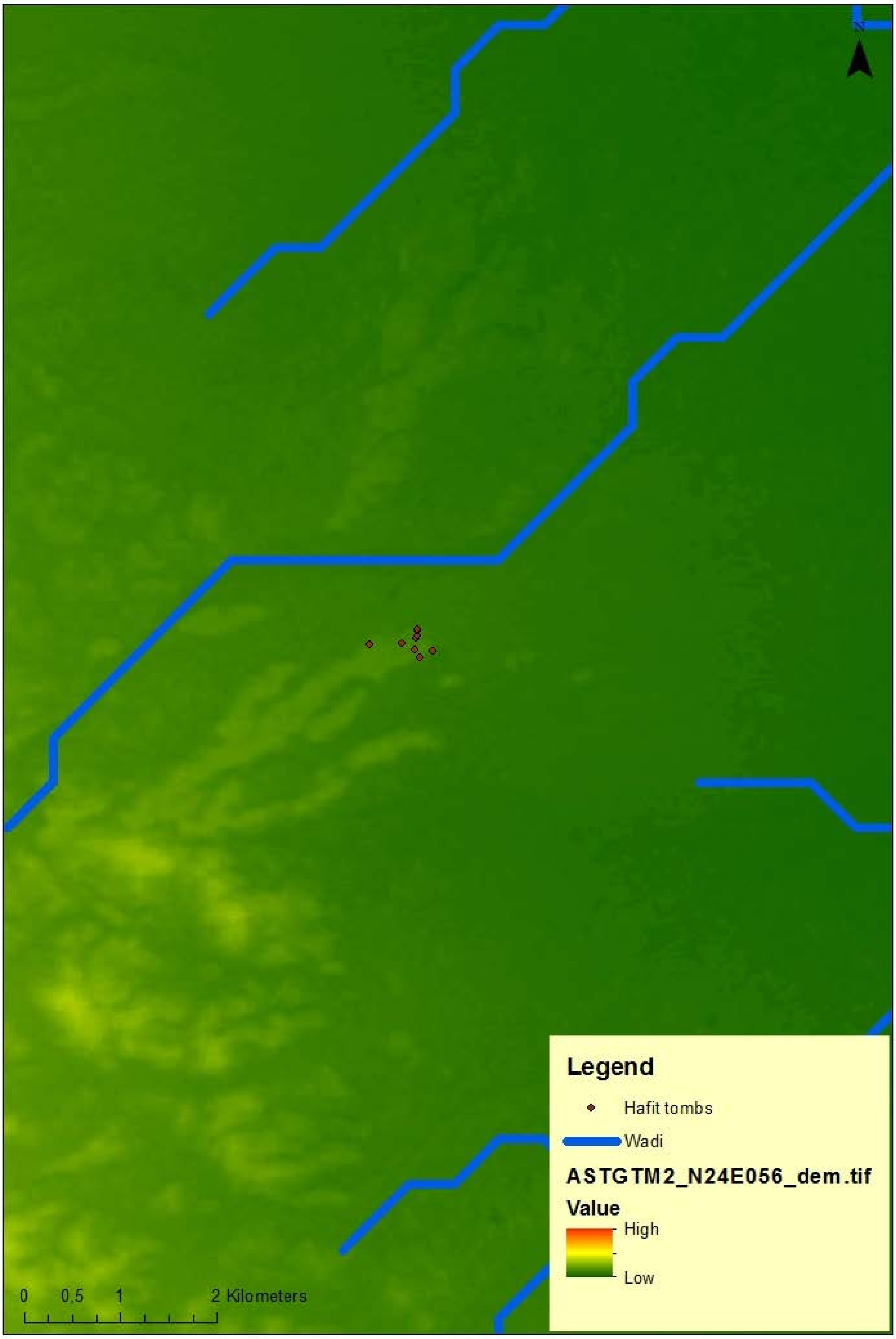


Figure 35. Digital Elavation Model (DEM) with the location of the tombs in the Wadi Fizh (map created by the author).

4.5 Visibility of the Hafit tombs

The final sub-question is centered on the visibility of the Hafit tombs. As discussed in the introduction of the thesis, no scientific research has been conducted on the visibility of Hafit tombs; even though the fact that these tombs are placed on high places has been often used to argue for a society concerned with protecting valuable resources, such as grazing grounds (see Chapter 2). In order to better understand the visibility of these tombs in the landscape, we need to create a testable approach on the perception of the landscape from a personal point of view. This type of analysis can be conducted in Arcgis. In order to conduct the analysis we first need a Digital Elevation Model (DEM) of the landscape. A DEM is basically a geo-referenced raster file, in which each grid in the raster is provided with a value that corresponds with the actual height of the terrain. The DEM model used in the current thesis is provided by the United States Geological Survey (USGS). The next step involves the creation of a viewshed which is done by using the **'Viewshed'** tool, located in **'Spatial Analysis'** options underneath the **'Surface'** option.

It has been argued by several scholars that the wadi systems must have been used by prehistoric people to travel from the interior to the coast (see Chapter 2). Therefore it seems logical to calculate the visibility of the tombs from the point of the wadis, as these dry riverbeds would have functioned as the main routes for travel. Thus, another raster file is need for the wadi systems. For the current thesis it was decided to use HydroSHEDS. HydroSHEDS is a raster map freely available by ESRI and offers geo-referenced data sets (vector and raster), including stream networks, watershed boundaries, drainage directions, and ancillary data layers such as flow accumulations, distances, and river topology information. Combined with the DEM previously mentioned it now becomes possible to create a map displaying the visibility of the tombs from the point of the wadi systems in our study area. The results of this analysis are presented in figures 36 and 37.

It is interesting to note that *all* of the tombs are clearly visible from the wadi system, despite the different distances to a wadi (see previous analysis). Another point worth noting is that there are plenty of other location on which the Hafit population could have built their tombs and still be visible from the wadi system as well as being closer to a wadi. The reason why they chose for those two banks along the Wadi Suq remains, at the moment, difficult to explain. For now it is sufficient to conclude that the current **'Viewshed'** analysis seems to support the hypothesis that Hafit tombs were purposefully constructed on highly visible places and that these locations can easily been seen from the wadis (eg. Cleuziou and Tosi 2007; Deadman 2017; al-Jahwari 2013).

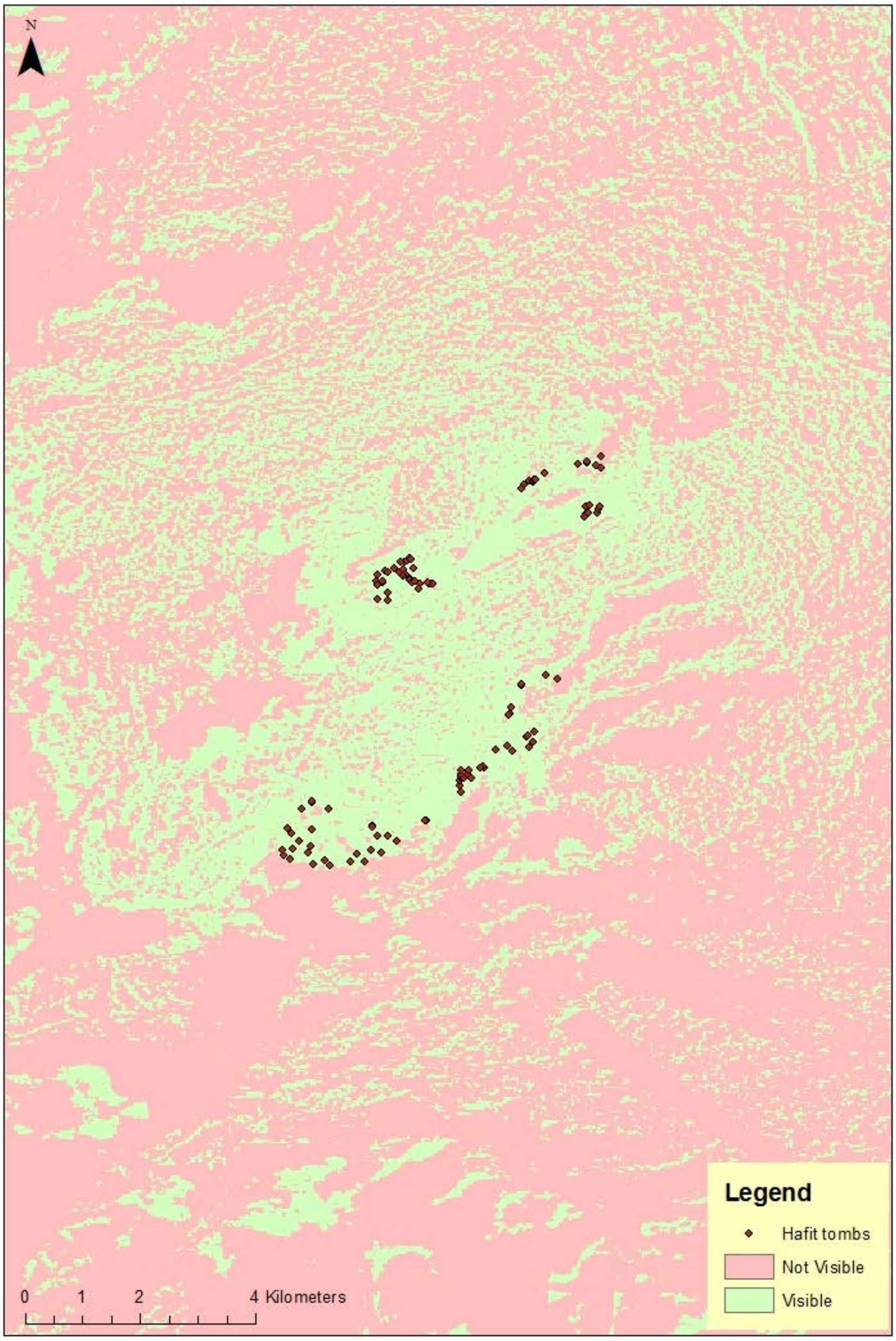


Figure 36. Viewshed analysis displaying the visibility of the Hafit tombs around Wadi Suq (map created by the author).

Figure 37. Viewshed analysis displaying the visibility of the Hafit tombs at S62 in the Wadi Fizh (map created by the author).

Conclusion

This chapter focused on the spatial analysis of the data generated by the WAJAP (see Chapter 3). Different tools in ArcGis version 10.2.2. provided by Esri, were used to ask specific question to the dataset. The first question centered around the overall distribution of the tombs in the study area. The analysis on the distribution of Hafit tombs showed that the Hafit tombs around the northern bank of the Wadi Suq display several high density clusters which are closely packed, while the density clusters on the southern bank are more evenly spread. Second, that the density of these tombs seem to increases towards the Lower Batinah. Third, that the density of Hafit tombs in the Wadi Fizh (S62) seems to mimic the density also witnessed on the northern bank of the Wadi Suq. It was also noted that Site 43, located on the northern bank of the Wadi Suq, is clustered similar to LPT clusters.

The second question focused on the orientation of the tombs. The analysis showed that half of the entrances of the WAJAP tombs are orientated towards the north-east/south-west, while 25 % are orientated east-west, 14% of the tombs are orientated north-south and 11% are orientated north-west/south-east. The orientation of the two largest groups seems to coincide with the variation in the azimuth of the sunrise between the months of June and September for the Sohar region, which varies between 63.8° (east-north-east) and 87.1° (east). This in turn seems to support Deadman's theory that there exists a clear coloration between the orientation of the entrances of Hafit tombs and the annual variation in the position of the sunrise. However, a second analysis which looked at the orientation of the tombs site-per-site, seems to contradict Deadman's theory. The site-to-site analysis argues against the notion that the orientation of Hafit tombs was connected to the movement of the sun as two of the Hafit 'cemeteries' in the study area display a different preference for tomb orientation.
The third question focused on the correlation between Hafit tombs and the wadi systems. It becomes clear from the analysis that the majority of the tombs located around the Wadi Suq are within 500 meters distance of the wadi and that only at the threshold of 1500 meters all of the tombs are within the reach of a wadi.
The final question was centered on the visibility of the Hafit tombs from the wadi-system. The analysis showed that all of the tombs are clearly visible from the

wadi system, despite the different distances to a wadi. It was also noted that there were plenty of other location on which the Hafit population could have built their tombs and still be visible from the wadi system as well as being closer to a wadi. The reason why they chose to build their tombs primarily on the two banks along the Wadi Suq remains, at the moment, elusive. However, the analysis does seem to support the hypothesis that Hafit tombs were purposefully constructed on highly visible places and that these locations can easily been seen from the wadis.

Chapter 5: Discussion

In Chapters 3 and 4 the methodology of the current thesis was elaborated and applied to the spatial dataset of the Wadi al-Jizzi Archaeological Project (WAJAP). The results of the various spatial analyzes were briefly discussed in Chapter 4. In this chapter a more in depth discussion will be presented as well as the conclusions for each of the research questions mentioned in the introduction of the thesis. A paragraph will be dedicated to the discussion of each research question, followed by a paragraph on the development of the funerary landscape in the study area during the Hafit period. Contrary to the other chapters, this chapter will not have a conclusion. The final conclusion of the thesis will be presented in a separate chapter.

5.1 The distribution of the Hafit tombs

The overall distribution of the Hafit tombs displayed several interesting patterns. First, that all the significant sites with large numbers of Hafit tombs are located around the Wadi Suq, instead of the larger Wadi al-Jizzi. Secondly, that all the Hafit cemeteries seem to have been located more closely to the area known as the Lower Batinah (see Chapter 3) than towards the mountains. Third, that the density of Hafit tombs in the Wadi Fizh (S62) seems to mimic the density also witnessed on the northern bank of the Wadi Suq. However, upon applying a density analysis to the dataset (see Chapter 4) a more detailed and nuanced picture of their distribution emerged. The Hafit tombs around the northern bank of the Wadi Suq display several high density clusters which are closely packed, while the density clusters on the southern bank are more evenly spread.

The most important observation from the density analysis is the identification of a cluster of Late Prehistoric Tombs (LTPs), which have arguably been dated to the first millennium BC by Deadman (Deadman 2017, 121-124). As discussed in Chapter 2, Deadman's study showed that, when compared to LTP clusters, clusters of Hafit tombs usually consist of a single structure, contain tombs that are rather distant from one another and cover a small area. He also noticed that LPTs are often found in close proximity to large numbers of Hafit tombs, usually overlapping Hafit cemetery space (Deadman 2017, 253-261). A similar pattern

can be observed for the WAJAP study area. The tombs at Site 43, located on the northern bank, seem to be clustered like LPT clusters.
Deadman explains the co-existence of both tomb types in the same areas as a re-use of Hafit grazing lands in later periods. Even though he recognizes the widespread adaptation of agriculture in later periods, he nonetheless argues that the LPT clusters are not consistent with sedentary populations (Deadman 2017, 285). Instead, he argues that a population similar to modern bedouins in Oman must have constructed the LPTs; who practice pastoralism, often own date palm gardens and were reliant or even formed part of sedentary inland/coastal communities (Deadman 2017, 285-286).

Deadman's hypothesis however, is rather unsatisfactory as he does not explain *why* the LPT clusters are not consistent with sedentary communities. Furthermore, his hypothesis implies that the protection of grazing grounds, and thus territoriality, still played a major role in the Iron Age (1100-300 BC) when the LPTs would have been constructed. This notion is in contrast to our current knowledge of the Iron Age, a period marked by rapid settlement growth, the application of agriculture on a large scale, a uniform and specialized material culture as well as the permanent occupation of all environmental zones of the Omani peninsula (Magee 2007, 86). It has been argued that these transformations in society came about due to the introduction of the *falaj* irrigation technique and the use of domesticated camels (Magee 2007; 2011). In a period in which a large part of the population is permanently occupying settlements, with a new irrigation system capable of reaching deep and hidden aquifers (*falaj*) and a new transportation mode which dramatically shortens the distance between the coast and the hinterland (the domesticated camel); it seems rather illogical that territoriality still played an important role. It is important to stress that this does not mean that pastoralists simply stopped to exists in the Iron Age. However, the fact that we witness a large part of the population occupying permanent settlements in the Iron Age in new and previously unoccupied environmental zones; seems to indicate a population less concerned with territoriality.
Furthermore, Deadman's dating of these tombs to the Iron Age is also problematic. Deadman LPT's are also known as 'cell-graves' (Deadman 2017, 120). As pointed out in Chapter 1, these so-called cell graves are also found in the

WAJAP study area. The cell graves in the Wadi al Jizzi, or terraced cairns as they are labeled by the project, are very similar to other known examples across the region. Yet the finds corresponding to these tombs can be dated to the first centuries AD and in particular to the Sasanian period, arguing for a post-Iron Age date for these type of tombs (Düring and Olijdam 2015).
Finally, if territoriality played such an important role, as Deadman suggests, we would expect to find multiple settlements of different time periods in close proximity to these tombs, each claiming a specific part of the landscape. The fact that no occupational remains, i.e. settlements have been found along the Wadi al-Jizzi and Wadi Suq gravel fan, even though there is an abundance of tombs ranging from the Hafit till the Sasanian period, seems to further stress this point (Düring and Botan 2018). All the settlements of the Bronze Age and Iron Age are located either in the hinterland of the Sohar region or on the coast (Düring and Botan 2018, 25).

So how can we explain LPT clusters, such as S43 in the Wadi Suq? In order to answer this question it is first important to understand that the reuse of older tombs was a common practice in every period on the Oman peninsula. At the site of Bat in the Sultanate of Oman for example, an older Umm an Nar tomb (2500-2000 BC) was partly reused to construct two Iron Age hut-graves next to the older tomb (Döpper 2015, 8). In the Wadi al-Qwar in the Emirate of Ra’s al Khaimah several excavated tombs of the Wadi Suq period (2000-1600 BC) were clearly reused in the Iron Age, in which the earlier human remains were pushed against one of the walls to create room for the Iron Age individuals (Phillips unpublished). A similar phenomenon was also observed in the WAJAP study area. Sites 50 and 51 are located in the Wadi Fizh and consist of dozens tombs dated to various periods. It was noted in 2017 that two of these tombs were hit by a bulldozer, while constructing a stone crushing installation. It was clear from the finds in the overlying spoil heaps that the tombs were constructed in the Wadi Suq period and reused in the Iron Age (Düring *et al* 2017).

Döpper has explained the phenomenon of reusing older tombs, as physical spaces which helped to evoke collective memories (Döpper 2015). She uses several theories in sociology to argue that while the individual has individual memories, social groups have a collective memory which always interacts with specific spaces. These spaces in turn cannot only become sites of memories, but can also be used to emphasize a connection with the past and the fact that a group has kept their identity (Döpper 2015, 8). It is in this context that we should regard and understand the LPT clusters found in the Wadi al-Jizzi. *If* these tombs were indeed constructed in a different period and deliberately put in between Hafit tombs, then we should regard them as 'tools' used to reaffirm the connection with the ancestors and the cemeteries as sites of memories. This point becomes more convincing when we consider that the vast majority of tombs at S43 have the same orientation as the tombs at, for example, S4; a site which has a Hafit type of clustering instead of a LPT type of clustering. By building the LPT in the same location and according to the same principles as Hafit tombs, the society behind the LPT's seem to want to reaffirm their connection with previous Hafit population and thus perhaps justify their presence in the landscape.

5.2 The orientation of the Hafit tombs

The second sub-question of the thesis focused on the hypothesis concerned with the orientation of the Hafit tombs. First proposed by Deadman in 2014, the hypothesis suggests a clear correlation between the orientation of the entrances of Hafit tombs and the annual variation in the position of the sunrise (Deadman 2014). In Chapter 4 an analysis was done on the tombs in the study area and compared their orientation with the data from the Wadi Andam. The first and most clear observation which could be made is the fact that the Entrance Survival Rate (ESR) is much higher in the WAJAP study area, even though the Wadi Andam counts a much higher number of Hafit tombs. The analysis also displayed that only four possible orientations exist for the WAJAP tombs: east/west, north/south, north-west/south-east and north-east/south-west.
Once the orientation of the two main groups, north-east/south-west and east-west, were compared to the annual variation in the azimuth of the sunrise for the Wadi al-Jizzi region, an interesting notion became observable. The orientation of the two main groups seems to coincide with the variation in the azimuth of the sunrise

between the months of June and September for the Sohar region, which varies between 63.8° (east-north-east) and 87.1° (east). These results are of significance as they do not only seem to support Deadman's theory, but also seem to imply that the tombs in the study area were constructed in the summer months. Furthermore, these results also seem to support the notion that the Hafit people were pastoralists using seasonal camp sites and travelling between the coast and the mountains in different seasons (see Chapter 1 and 2).

However, it seems illogical that the Hafit tombs in our study area would have been constructed in the hot summer months when there is a lack of fresh water in the plains and the hinterland. Furthermore, if we look and compare the tomb-orientation site-by-site, we do find a slightly more nuanced image. The orientation of the tombs at S6 and S58 are evenly distributed and do not clearly correlate with the azimuth for the period between June and September (the summer season) nor with November and March (the winter/rain season). This in turn would suggest that the tombs at both sites were constructed throughout the year. Yet, we do find a clear tendency at the other sites to construct Hafit tombs towards the north-east/south-west and east-west. So how can we explain this discrepancy?
One possible explanation is that we are actually looking at different cemeteries constructed in different moments during the Hafit. As discussed in Chapter 1, the Hafit period lasts for 700 years from 3200-2500 BC. It is somewhere in that timeframe that the population of the Oman peninsula transforms from pastoralists travelling between the mountains and the coast, to a sedentary population practicing agriculture (see Chapter 1). The exact moment of this transformation is still debated, but it is widely accepted that the introduction of sedentism and agriculture must have taken place at the end of the Hafit period (eg. Magee 2014, 93-98). Thus there exists a possibility that the tombs at sites 4, 5, 43 and 62 (of which the orientation coincide with the annual variation in the azimuth of the sunrise) are of an earlier/nomadic phase of the Hafit. While the tombs at sites 6 and 58, with a more evenly distributed orientation, might actually represent a later/sedentary phase. However, to test this hypothesis a more elaborate investigation of all six cemeteries is needed, in which aspects such as construction techniques are studied and compared in detail.

For now, all that can be said is that the orientation of the tombs around sites 6 and 58 do not seem to be in line with the other Hafit tombs.

5.3 The correlation between Hafit tombs, visibility and the wadis

The third and fourth sub-questions focused on the correlation between the Hafit tombs and the wadi systems. The analysis in Chapter 4 showed that the vast majority of the tombs around the Wadi Suq are within 500 meters of a wadi system. The tombs on the southern bank however, are located slightly further away. Only at the threshold of 1500 meters do all tombs in the study area correlate to a wadi. The **'Viewshed'** analysis conducted in Chapter 4 displayed that all of the tombs are clearly visible from the wadi system, despite the different distances to a wadi.

Both of these analyses show that there is a correlation between the Hafit tombs and the wadi systems and seem in support of the hypothesis that the wadi system was used by the Hafit population to move between the mountains and the coast (eg. Cleuziou and Tosi 2007; Deadman 2017; al-Jahwari 2013).

5.4 The territorial model

One of the most prominent theories concerning the Hafit, is the one proposed by Cleuziou on territoriality (see Chapter 2). In summary, this theory suggests that the Hafit society was organized around kinship and each cemetery symbolized a specific tribe. The fact that monumental tombs are positioned on highly visible places, also suggests a concern with territoriality amongst the different tribes. As discussed in Chapter 2, this theory has his origins in the 1970's and '80s. Nonetheless, despite being over 40 years old, this theory still has a significant influence on the discussion of the Hafit period and needs to be addressed in the current thesis. The results presented in Chapter 4 do not argue against the theory, nor do they clearly support it. The results from the density analysis for example, do seem to argue for the existence of different Hafit cemeteries. However, this does not mean that each of these cemeteries was connected to a specific tribe. Nor that each of the cemeteries signifies a specific territory controlled by a certain tribe.

As pointed out in Chapter 2, there are several problems with the territoriality model. The biggest issue with the model, however, is the fact that it is a rather modern conception which projects modern concerns on the procurement and security of valuable resources on to past societies. The *meaning* of tombs is neglected in favor of more evolutionary concepts, such as the competition for resources. This notion becomes more obvious when we consider that the landscape on the Oman peninsula became drier starting around 5800 BC (see Chapter 1). Yet, it takes another 2600 years for Hafit cairns to emerge. If the landscape became drier and resources, such as locations with surface water, became scarce; why would it take another 2600 years to develop a type of man-made construction clearly marking such resources? One would expect the emergence of territory markers in a shorter time span.

Another point worth discussing is *why* monumental tombs keep on existing in the region in later periods when, according to several scholars (eg. Magee 2014, 93-96; 215-219), the number of resources increases due to the introduction of agriculture and the *falaj* irrigation? Monumental tombs keep on occurring in the region in the Umm an Nar period (2500-2000 BC) and in the Iron Age (1100-300 BC). There is good evidence that in both of these periods the population was sedentary and practicing different forms of agriculture, thus increasing the number of resources (see Chapter 1) and yet we still encounter the construction of monumental tombs. At the moment, there is not a single evidence for the existence of territoriality in these periods (Magee 2014).

Another interesting aspect worth exploring in regards to this deiscussion, is to see what happens in our study region *after* the Hafit period. In the Wadi Suq and Wadi al-Jizzi regions we witness an increase of tombs in later periods, but not a single settlement is constructed. The opposite is true for the Wadi Fizh, were we witness tombs and settlements of the same periodes in close proximity to each other (Düring *et al.* 2017, 1). If there are valuable resources in the Wadi Suq and Wadi al-Jizzi worth procuring and securing, why aren't there any settlements of later periods? Why do we only encounter tombs?
One possible explanation is the fact that we are dealing here with a rather dry and barren part of the Wadi Suq and Wadi al-Jizzi. If indeed some form of

territoriality existed in the Hafit and in later periods, it would make sense to deliberately build tombs on a more ‘neutral’ part of the landscape without any resources. These areas would have served as communal burial grounds, for a number of various social groups without feeling the need to claim it as part of their territory (Düring and Botan 2018, 25).

Yet, we cannot deny the fact that these tombs are monumental and therefore must have been built with the intention to convey *some type of message* to the beholder (see Chapter 2 for the discussion on monumentality). The answer to this question will remain elusive until more Hafit settlements are identified and explored and more Hafit tombs are excavated and compared. For the moment is it sufficient to say that that the fact that these tombs are monumental, seems *not* to be connected to a concern with territoriality.

5.5 The Hafit period in the WAJAP study area

The Hafit period is only represented by tombs in the WAJAP study area. As such, we cannot say much on settlement organization or subsistence strategy. However, with the help of the different analyses conducted in Chapter 4 it is possible to provide a hypothesis on the development of the funerary landscape in the study area.

The first point worth discussing is the chronology. As previously mentioned, the Hafit covers a period of 700 years. Thus, it is important to explore whether all of the six sites discussed in the current thesis were in use simultaneously or at different moments in the Hafit period. There are several possible scenarios. The first scenario is that all of the sites were simultaneously occupied (fig. 38). Yet this provides us with a problem, especially when we consider the density cluster of site 43 which is more in line with LPT clusters. Despite the discussion on *when* these LPT’s were constructed, it is clear that the general consensus is that these tombs are of a later period than the Hafit. Thus the fact that the tombs of site 43 are differently clustered, seems to suggest that they are (at least) post-Hafit.

The second scenario is that all of the sites are contemporary, except for site 43 (fig 39). However, this scenario also seems unlikely. If we take the orientation of the tombs into consideration and presume that the orientation of the tombs can be used as a proxy for the season in which they are constructed (see Chapter 4), two sites seem to deviate from the norm. As discussed in the previous paragraphs, the tombs at sites 6 and 58 clearly deviate in their orientation from the other sites. The fact that the orientation of these tombs is more evenly distributed, while tombs at the other four sites are clearly orientated towards the north-east/south-west and east-west, seems to imply that tomb construction happened throughout the year. The reason *why* the tombs at site 43 are still orientated primarily orientated towards the north-east/south-west while displaying a LPT type of clustering has already been discussed and can explained as a 'tool' to create collective memories. This means that it is possible that the tombs at site 43 were constructed in a post-Hafit period, but still orientated in a similar way as the Hafit tombs.

The third scenario is that we are dealing with tombs constructed in different periods and that the tombs increased steadily in the course of 700 years. In this scenario the tombs at sites 4, 5 and 62 are contemporary and most likely constructed in an earlier phase of the Hafit period. This would explain their similarities in density and overall preference for orienting their tombs towards the north-east/south-west and east-west. It is also likely that the tomb constructors were pastoralists travelling between the mountains and coast. This would explain why the orientation of those tombs matches the azimuth of the sunrise between the months of June and September. As previously stated, if the tombs were built by a sedentary community focused on the movement of the sun; one would expect a more even distribution when it comes to orientation. This is the case with tombs on sites 6 and 58, which in this scenario would have been constructed in a later phase of the Hafit when the population became sedentary. As discussed previously, the exact moment of this transition is still open for discussion, but it is generally accepted that it occurred at the end of the Hafit period. In the final phase of this scenario, the tombs of site 43 are constructed as part of collective memories in a post-Hafit period (fig. 40).

Figure 38. Map displaying the first scenario for development in the study area, in which all the tombs were in use simultaneously

(map created by the author).

Figure 39. Map displaying the second scenario for development in the study area, in which all the tombs are contemporary except for the tombs at site 43. The white dots represent the tombs at site 43.

(map created by the author)

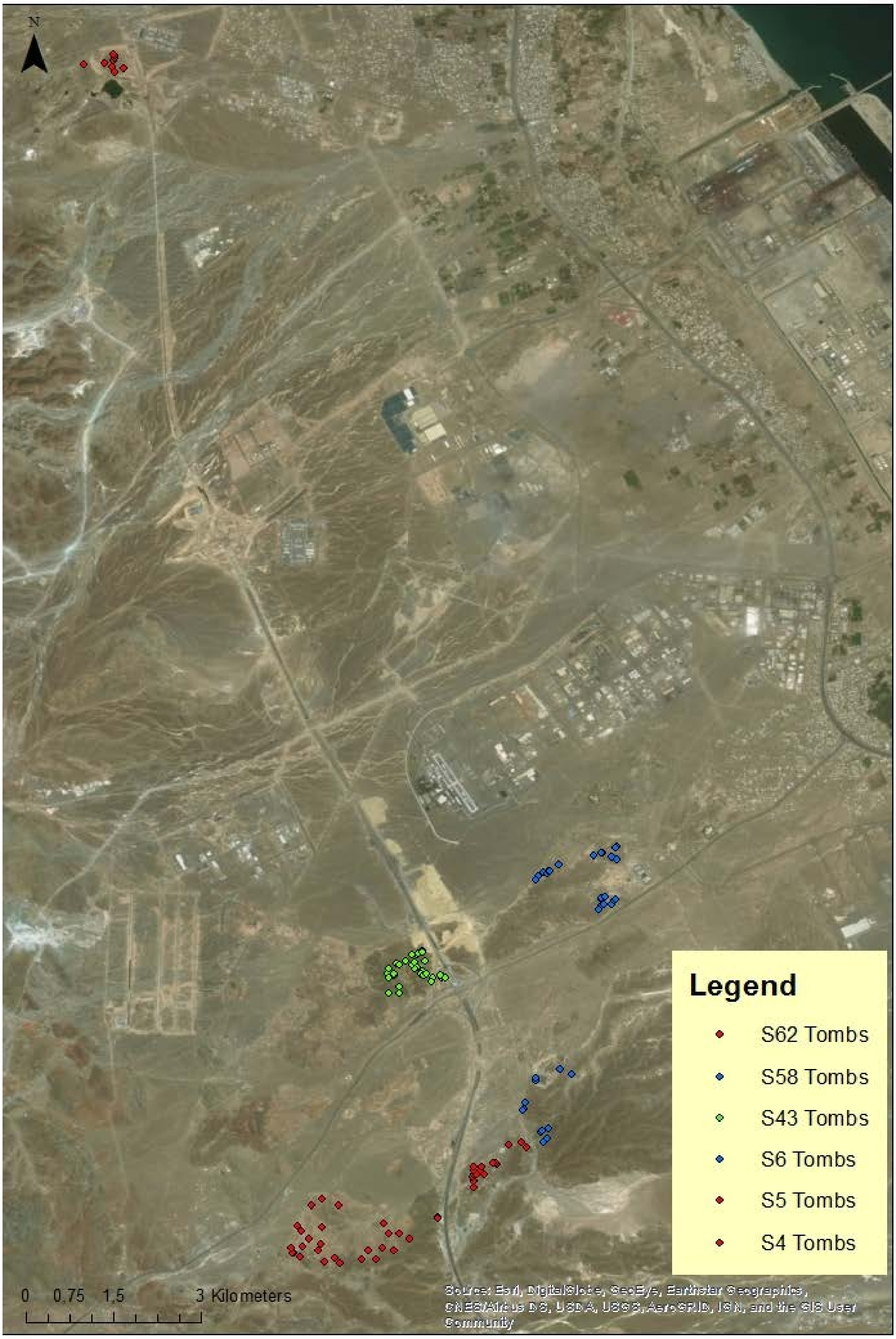


Figure 40. Map displaying the third scenario for development in the study area, in which the tombs at sites 4, 5 and 62 are constructed in an earlier phase of the Hafit, the tombs of sites 6 and 58 at the end of the Hafit and the tombs of site 43 in a post-Hafit period.

(map created by the author)

Conclusion

The aim of this thesis has been to understand one of the most poorly understood periods of the Oman peninsula: the Hafit period (3200-2500 BC). This period is best known for its above ground funerary structures. These so called 'Hafit cairns' are estimated to number over the 100.000 and are located in various environments across the peninsula, including mountains, foothills and coastal areas. Interesting enough, the settlements connected to these tombs have proven to be more elusive. As such, in the past decade various researchers have studied the spatial distribution of the Hafit tombs and many hypotheses have been put forward to explain the social-economical organization of the Hafit population on the Oman peninsula. In order to test their validity, each of these hypotheses has been translated into a research question and subsequently applied to a single dataset. This is of importance as with each new study a new hypothesis would be proposed without thoroughly testing the validity of the previous ones. A study in which the validity of *all* hypotheses are tested against a single dataset, was still lacking.
The overall research question proposed in this thesis was: "What is the spatial distribution of the Hafit tombs in the Wadi Suq and the Wadi al-Jizzi and can they be explained with current theories?"
In order to answer this question, several sub-questions were created, each centered around one of the current theories:

- What is the spatial distribution of the Hafit tombs in the Wadi Suq and the Wadi al-Jizzi? Do they differ and if so how?

- Are the Hafit tombs located in the study area orientated towards a specific direction? And if so, does it correspond to the annual variation in the azimuth of the sunrise?

- Is there a clear coloration between Hafit tombs and the wadi system in the study area?

- What is the visibility of the Hafit tombs in the landscape?

The dataset used this thesis to test these theories derived from the Wadi al-Jizzi Archeological Project (WAJAP). WAJAP has been chosen as a case-study because, thus far, only limited research has been conducted in the Batinah region. Most of the research on the Hafit period has been mainly focused on the coastal sites, which are primarily focused on a maritime substance strategy and the exploitation of the few water catchments. Using various criteria, such as the shape of the funerary structure and its diameter, 158 tombs were identified as being Hafit out of the 3000 documented funerary structures. It must be stated that the number of 158 represents not the *actual* number of Hafit tombs, but rather the quantity which *most likely* represents the actual number of Hafit tombs. Once the dataset was complete, several analyses were conducted in ArcGis version 10.2.2. provided by Esri.

Regarding the overall distribution of the tombs, it can be concluded that significant sites with large numbers of Hafit tombs are primarily located around the Wadi Suq, instead of the larger Wadi al-Jizzi. Secondly, that all the Hafit cemeteries seem to have been located more closely to the area known as the Lower Batinah than towards the mountains. Third, that the density of Hafit tombs in the Wadi Fizh seems to mimic the density also witnessed on the northern bank of the Wadi Suq were most tombs are located. A important observation was also made regarding the identification of a cluster of Late Prehistoric Tombs (LTPs), which are of a post-Hafit date. The tombs at Site 43, located on the northern bank, seem to be clustered like LPT clusters. The existence of these tombs amidst Hafit cemeteries has been explained as a form of collective memory, created and instigated by a later populations occupying the same area.

The orientation of the tombs seemed initially clearly focused towards the north-east/south-west and east-west. This coincides with the variation in the azimuth of the sunrise between the months of June and September for the Sohar region, which varies between 63.8° (east-north-east) and 87.1° (east). The analysis seemed to argued for a nomadic population, with a fixation for the movement of the sun and which would occupy the area around the Wadi Suq and Wadi al-Jizzi in the summer months. However, a site-to-site comparison displayed a more nuanced picture. The orientation of the tombs at S6 and S58 are evenly distributed and do not clearly correlate with the azimuth for the period between June and September (the summer season) nor with November and March (the winter/rain season). This in turn would suggest that these tombs were constructed throughout the year. A possible explanation for the discrepancy between the sites was provided by explaining that the Hafit period covers 700 years and somewhere in that timeframe the population of the Oman peninsula transformed from pastoralists travelling between the mountains and the coast, to a sedentary population practicing agriculture. The exact moment of this transformation is still debated, but it is widely accepted that the introduction of sedentarism and agriculture must have taken place at the end of the Hafit period. Thus, it is plausible that the tombs at S6 and S58 were constructed in a later phase of the Hafit in which people had become sedentary.

The third and fourth research questions were centered around the correlation between the wadi systems and the tombs and the visibility of the tombs from these wadi systems. The analyses in the current thesis displayed that the vast majority of the tombs around the Wadi Suq are within 500 meters of a wadi system. The tombs on the southern bank however, are located slightly further away. Only at the threshold of 1500 meters do all tombs in the study area correlate to a wadi system. Interestingly, all of the tombs are clearly visible from the wadi system, despite the different distances to a wadi.

This thesis also discussed the validity of the territorial model for the Hafit period. This model has had a significant influence in the field for the past decades. This thesis argues against its application in the study area for several reasons. First is the fact that it is a rather modern conception which projects modern concerns on the procurement and security of valuable resources on to past societies. The meaning of tombs is neglected in favor of more evolutionary concepts, such as competition for resources. Second, that monumental funerary structures are being constructed even after the Hafit, in periods were territoriality no longer plays a significant role in societies. Third, that no later settlements have been discovered in the study area where the majority of Hafit tombs are located (Wadi Suq and Wadi al-Jizzi). If there were any valuable resources, worth procuring and protecting, one would have found a settlement of later periods; a pattern which exists in the Wadi Fizh. One possible explanation could be the fact that we are dealing here with a rather dry and barren part of the Wadi Suq and Wadi al-Jizzi. If indeed some form of territoriality existed in the Hafit and in later periods, it would make sense to deliberately build tombs in a more 'neutral' part of the landscape without any resources. These areas would have served as communal burial grounds, for a number of various social groups.

Finally, this thesis has tried to re-create the development of the funerary landscape in the study area during the Hafit. It has been proposed that the tombs at sites 4, 5 and 62 are contemporary, due to their similarities in density and overall preference for orienting their tombs towards the north-east/south-west and east-west, and most likely constructed in an earlier phase of the Hafit period. In a later phase of the Hafit, when the population became sedentary, the funerary landscape became bigger with the construction of the tombs on sites 6 and 58. Finally, the tombs of site 43 are constructed as part of collective memories in a post-Hafit period.

In the end, the answer to the main research question is that current theories are unsatisfactory to explain the distribution of Hafit tombs in the WAJAP study area. Several theories, such as Deadman's theories on orientation and LPT's, do hold to a certain degree. Yet when we look at the site-to-site comparison, Deadman's theories fail to explain the patterns encountered in the dataset. This does not mean that we should abandon all existing theories completely. We need rather to investigate to which degree these theories are applicable to our current understanding of the Hafit period.

As discussed in the introduction of this thesis, there are no comparable studies that test the validity of current theories on a single dataset. More research is needed in this regard. Not only to improve existing theories or add new ones, but also to determine whether the patterns discussed in this thesis are unique for the study area or are also present in other parts of the Oman peninsula. More research is also need on funerary rites of the Hafit period, for this topic has been hardly explored. For example, the reason why ceramic vessels from Mesopotamia are only found in the tombs and not in the settlements could help us to understand certain aspects of the funerary rites.

Abstract

This thesis focusses on Hafit tombs (3200-2500 BC) in the Wadi Suq and Wadi al-Jizzi regions of the Sultanate of Oman. The main research question proposed is whether existing theories on the Hafit period can explain the distribution pattern present in the study area. In order to answer this question, four sub-questions were created exploring: the general distribution of the tombs, the orientation of the tombs and the correlation between the tombs, visibility and the dry river beds also known as *wadis*. Each of the sub-questions was answered by applying different tools in ArcGis on the dataset provided by the Wadi al-Jizzi Archaeological Project. Regarding the overall distribution of the tombs, it can be concluded that significant sites with large numbers of Hafit tombs are primarily located around the Wadi Suq, instead of the larger Wadi al-Jizzi and that all the Hafit cemeteries seem to have been located more closely to the area known as the Lower Batinah than towards the mountains. The analysis also revealed that the tombs at Site 43 seem to be clustered like Late Prehistoric Tombs (LTPs), which are of a post-Hafit date.

The orientation of the tombs seemed initially clearly focused towards the north-east/south-west and east-west. This coincides with the variation in the azimuth of the sunrise between the months of June and September for the Sohar region. However, a site-to-site comparison displayed a more nuanced picture. The orientation of the tombs at S6 and S58 are evenly distributed, suggesting that they might have been constructed in a later phase of the Hafit period.

The analyses in the current thesis also displayed that at the threshold of 1500 meters all tombs in the study area correlate to a wadi system. Interestingly, all of the tombs are clearly visible from the wadi system, despite the different distances to a wadi.

This thesis concludes that current theories are unsatisfactory to explain the distribution of Hafit tombs in the study area and that more research is needed in this regard. Not only to improve existing theories or add new ones, but also to determine whether the patterns discussed in this thesis are unique for the study area or are also visible in other parts of the Oman peninsula.

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