THE ARCHAEOLOGICAL LANDSCAPE OF QATAR

Sultan MUHESEN (*), Peter SPENCER (**), Faisal A. Al Naimi (***) and Richard CUTTLER (****)

(*) Qatar Museums, P.O. Box 2777, smuhesen@*qma.org.qa*
(**) University of Birmingham, Edgbaston, Birmingham B15 2TT, +44 (0)7553 560258, *peterspencer@qnher.com*
(***) Qatar Museums, P.O. Box 2777, *falnaimi@qma.org.qa*
(****) University of Birmingham, Edgbaston, Birmingham B15 2TT, +44 (0)7985 705894, *r.cuttler@bham.ac.uk*

Abstract
Archaeologists are fully aware about the importance of studying past environments in a bid to understand their impact on the formation and development of archaeological sites. An understanding of differing and changing environmental conditions enable us to answer crucial questions about human lifestyles in the past, notably where, when, why, and how people could live. Over the past few years in Qatar studies into past environment have become a central theme of research. Combined with the results of remote sensing, GIS and groundtruthing, environmental proxy data is providing important contextual data about the dynamics of prehistoric societies within a hyperarid landscape.

Key words: Qatar, Palaeoenvironment, Holocene, ʿUbaid, Landscape Archaeology

Introduction
During the last few years, important new information has been obtained by way of advanced studies in the archaeological landscape of Qatar. This newly retrieved data match, in general terms, with what is known from wider Arabia. Human occupation was clearly dependent on identifying and exploiting the natural resources available. Most of the important early sites are to be found along the coast, in wadis, near oasis, and other places where, water, vegetation, fauna, and raw materials were to be found. Neolithic and ʿUbaid settlements dating to the 7th to 4th millennium BC (Fig. 1) seemed to have profited from favorable environmental conditions in the Holocene. Climatic deterioration seems to have prevailed during the Bronze and Iron ages of the 3rd to 1st millennium, during which time human settlements became sparse, poorer, and limited in scope. Subsequently, coinciding with the first millennium CE, cultural and technological progress especially in the harvesting of water allowed people to exploit dry areas inland and build settlements there, as attested by the discovery of many rich agricultural and pastoral sites and the development of towns especially in Islamic times. Recent archaeological survey work initiated by the Qatar Museums Authority has found such sites are spread out over all of the Qatar Peninsula

The landscape of Qatar and Holocene environmental change
The peninsula of Qatar comprises largely of Tertiary limestone, shale and dolomite of the Upper Dammam Formation, which formed in shallow marine conditions in the latter half of the Eocene Epoch. An anticlinal arch aligned north-south along the centre of the country is one of the largest structural features of the Arabian Plate (Fig. 2). Wadi systems can be traced from this anticline to the coast, and are places interspersed with dissolution hollows or collapsed karst where surface sediment has accumulated. Known locally as *rawdah*, these sediment basins have a important impact on the pattern of interior drainage, forming catchment areas for surface water runoff. This allows for aquifers to be recharged through seepage, rather than allowing surface water to be discharged along wadis into the sea. *Rawdah* account for c.335km^2 of the surface area of Qatar [1] totalling approximately 2093 individual areas. These are important for agriculture and low level vegetation. Karst formed during phreatic conditions in the Middle Pleistocene (around 560,000 to 325,000 years ago) due to the

[1] Sadiq & Nasir 2002

dissolution of carbonate-evaporite deposits by circulating groundwater, and takes the form of caves, sinkholes and sediment hollows (*rawdah*). It has been calculated that there are more than 9700 caves (*duhul*)/karst-related features most of which are located in northern Qatar [1].

While the extent of Aeolian sand (dunes) across Qatar during the Late Pleistocene is less-well understood, it is considered to have been more extensive than the present day[2]. In Qatar barchan dunes are mostly limited to the southeast of the country, forming the northern-most extent of the *Rub' al-Khālī*. Prior to 13000 years ago, lower sea levels and the prevailing northwest '*Shimal*' wind probably facilitated the transport of oolitic sands across the exposed floor of the Arabian Gulf and into northern Qatar. As sea levels rose the Arabian Gulf became a sediment trap, cutting off the supply of Aeolian sand and exposing wadis and *rawdah* in northwest Qatar[3].

As late as 8200 years ago extensive areas of the Gulf between Qatar, Bahrain and the Emirates were most likely free from marine influence, with research suggesting present sea levels were reached between ~7000 and 6000 years ago[4]. Positive sea-level tendencies continued, with a highstand of between [+] 1 – 3m between ~5800 and 4600 BP[5], marking the extent of the Flandrian Transgression. Lambeck and Vita-Finzi both produced a set of synchronous dates from *Al Khor*, *Wādī Lusail* and *Bir Zekrit*, with negative sea-level trends commencing *c*. 4280±160BP and 4690±80BP (Lambeck 1995; Vita-Finzi 1978). Taylor and Illing[6] produced dates from *Ras Abrouq* and *Bir Zekrit* which suggested the trangressive phase and highstand were slightly later. At *Ibn Ghanim*, north of the current town of *Al Khor*, evidence suggests maximum height was reached *c*.5000 BP with negative trends established by *c*.3000BP[7].

Most early to mid-Holocene sites are found along wadis, the coast, or on the edge of *rawdah* where water, vegetation and fauna were more abundant (Fig. 1). The arrival of ʿUbaid-related coastal settlement during the 8th millennium BC coincides with climatic amelioration in some parts of the Arabian Peninsula and a rising sea levels. The ameliorating climate is associated with a northwards shift of the Indian Summer Monsoon belt (ISM). However, environmental proxies record a significant variation in the range, duration and intensity of the ISM at different latitudes across Arabia. This suggests it is unlikely that such pluvial conditions occurred simultaneously across the entire peninsula, and should be considered as a time-transgressive event. Proxy evidence suggests the ISM affected southern Arabia around 10000 years ago, but probably took a further ~500 to 1500 years to advance as far as the northern Emirates (Fig. 3). Thus it is unlikely that the northwards movement of the ISM during the early Holocene influenced areas north of ~23-24° latitude[8] and probably rarely had much direct impact on central to northern Arabia or Qatar.

Pioneering work by Peter Glob[9], Holger Kapel[10] and Beatrice de Cardi[11] indicated a preference for coastal settlement during the prehistoric and later Islamic periods. The effects of fluctuating sea levels were pivotal to the research of early expeditions and laid the foundation for missions in the 1970s and 1980s which focused their exploration on the coastal zone[12]. This existing body of work sought largely to establish landforms within the country associated with former coastlines and the scope of human exploitation during prehistory. Surveys by the QNHER project (a collaboration between the Qatar Museums and the University of Birmingham, suggest archaeological sites are not simply found around the coast but are fairly evenly distributed across the northern extent of the Qatar Peninsula.

---

[2] Cuttler *et al*. 2013a
[3] Cuttler *et al*. 2011, Cuttler 2013, Glennie & Singhvi 2002
[4] Lambeck 1996
[5] Vita-Finzi 1978
[6] Taylor and Illing 1969
[7] Inizan 1988
[8] Fleitmann *et al*. 2004
[9] Glob 1957
[10] Kapel 1967
[11] de Cardi 1978;
[12] Inizan 1988

Tomb construction and population demographics

Climatic deterioration during the 3rd to 1st millennium BC within the southern extent of the Arabian Peninsula does however, coincide with a paucity of sites in Arabia and Qatar, and may reflect a population decline, or possibly a change of lifestyle from sedentary to nomadic. There is also little evidence for late pre-Islamic settlement, however, the 1st millennia BC sees a sharp rise in the construction of burial cairns, particularly in northern Qatar. Extensive survey around *Wādī Debayān* in the nortwest of Qatar has revealed substantial differences in the regional density and distribution of monuments. Currently 1449 sites are recorded within or around the hinterland of the wadi, of which 690 have been tentatively ascribed to the prehistoric and would appear to relate to pre-Islamic burial cairns. Most of the cairns within the wider region surrounding Wādī Debayān remain undated (470 individual sites), currently burial cairns, cairns and clusters thereof, form 48% of the total number of sites within the 13km radius of the mouth of the wadi.

Such density suggests either the construction and use of such monuments must span a much greater period than previously thought or, based upon the relative dates obtained from excavated examples, be related to a sharp increase in activity and populations levels during the immediate post iron-age (c.350 BC) and decline during the Sasanian period (c.224 AD)[13]. Population increase can be linked to a number of factors; gradual changes are usually the results of long-term processes within the cultural group or wider environment and may be linked to such factors as resource acquisition & exploitation, trade and internal political and cultural social structures. Rapid or sudden fluctuations of populations, however, are usually the results of external factors altering the base conditions upon which such cultural groups are based; war, economic competition and disease may adversely affect a population, however, examples from around the world and within the gulf have consistently proven the importance of ecological and environmental factors in the development of human populations.

Previous excavations of burial cairns in Qatar have discovered pottery; iron sword fragments and articulated camel bone. Dating from such finds has generally suggested dates between *c*.350BC – 310AD. Similarly cairns at *Lisha*, north-east of *Wādī Debayān* produced human bone (vertebrae and femur) a sardonyx bead and the lower part of the blade of a sword[14]. Datable finds in association with burial cairns are often few and it is more commonplace to find such cairns devoid of any artefacts either due to tomb robbing in antiquity or poor preservation. Additionally, bone survival and preservation is extremely poor, resulting in insufficient data for potential radiocarbon dating. However, the excavation and absolute dating of significant numbers of these burial cairns by the QNHER project and the Qatar Museums over the past six years has begun to provide us with a clearer understanding of population dynamics and funery practices in prehistory. It is now evident that many tombs assumed to date to the late pre-Islamic period may in fact date to earlier periods such as the Neolithic and Bronze Age. Radiocarbon dating and OSL dating suggests funeary practices established in the Neolithic period changed very little over the millennia. While it has now been proven that these burial monuments relate to a longer time span, the relative number of tombs dated to the late pre-Islamic period remains high.

Islamic settlement and transitions with Bedouin lifestyles

Surveys over the past six years have identified significant numbers of Islamic sites including Bedouin temporary settlements, mosques, abandoned villages and small homesteads. The earliest Islamic site discovered to date was a small homestead, located approximately 4km to the south of *Al Wakra* (Fig. 2). Excavations in 2011 revealed the presence of a structure built with large, flat stone slabs, with adjoining three rooms and internal divisions. The dates returned by the radiocarbon samples from the domestic structure cluster around the late 7th to mid 8th century AD (1210±30 BP, Beta 325374, Cal AD 710 to 750 [Cal BP 1240 to 1200]/Cal AD 770 to 890 [Cal BP 1180 to 1060]). The pottery assemblage indicates extensive trade with western Iran and the wider Gulf period during Umayyad and

[13]Cuttler *et al*. 2013b
[14] Schreiber *et al*. 2009

early Abbasid rule. Although comparative sites within Qatar are entirely absent, the building techniques are paralelled by other early pre-Islamic and Nestorian sites in the wider gulf region.

During the Abbasid period the number of settlements in Qatar increases and may indicate a temporary change from nomadic to seddentary lifestyles. These settlements, such as those at *Merwab*, *Musaykah* and *Al Athba* appear to be small villages[15] or ribbon settlements often on an east-west alignment. This alignment appears to be reflected in the layout of later Bedouin temporary settlements. In additon, almost all of these settements are located within the interior and away from coastal areas, as opposed to later Islamic settlement which is almost exclusively coastal.

By the 10th century AD most of these settlements would appear to have been abandoned infavor of a Bedouin lifestyle. This is demonstrated by a rise in the number of temporary Bedouin settlements, which by the 15th and 16th centuries become augmented by the rise of Islamic towns around the northern coast of Qatar. In northern Qatar two Islamic towns are of particular importance to both trade and the pearling industry, *Al Zubara* on the northwest coast of Qatar and *Al Huwaila* on the northeast.

Geomorphology, ecology & environment

Minor changes in a marginal environment such as the Arabian Peninsula can have significant effects on settlement patterns (*Ibid*). Fluctuations in climate, aquifers and sea level affect the accessibility, availability and security of essential resources such as food and water thus modifying the duration an area may provide sufficient resources for a population. Whether a population is nomadic or sedentary will likewise affect its own requirements and thus which areas are suitable for its continued existence.

In Qatar the presence of several distinct ecosystems has been noted; the hyper-arid and largely sterile dune systems of the south; the extensive interconnected system of drainage basins and wadis; the isolated environmental refugia of the *rawdah* and the resource rich coastal mangrove forests and protected bays. The presence and development of such environments is directly linked to the nature of not only factors such as climate patterns, sea level and underlying geology but to the geomorphology of the land itself of which all these factors form a contributing influence.

When the location, nature and tentative date of the 1449 sites recorded in the hinterland of *Wādī Debayān* are displayed against proximal factors such as geology, hydrology and topology, patterns emerge that that link these sites to their wider environment and landscape. Permanent Islamic settlements are always situated within the immediate area of silty alluvium deposits, rich agricultural land, associated with the presence of *rawdha*. Prehistoric sites while occurring at multiple elevations are always situated in the liminal areas between topographical changes, slopes, hill crests and outcrops commanding extensive views of the surrounding landscape, and rarely do we find evidence for prehistoric activity below the [+] 1-3m zone attributed to the sea level maxima. Furthermore when examining the geological and environmental attributes of such areas we find recurring patterns in the site typology, middens are surrounded by flint and artefact scatters, situated near to natural flint beds. Likewise recent paleoenvironmental work has shown sheltered bays and developing lagoonal areas, such as *Wādī Debayān*, would have encouraged the development of extensive mangrove forests rich in floral and faunal resource during periods of sea level stability and regression.

Clearly the positioning, extent and nature of these sites is inextricably linked to the nature of the wider landscape around them, and the unfolding prehistorc cultural landscape of Qatar is not of isolated archaeological sites, but of a dynamic population exploiting and subject to the wider landscape around them, a process which is most visible in later Bedouin cultures for which the region is renound. Extensive coastal surveys undertaken by the Qatar Museums and the University of Birmingham aimed to refine existing topological and environmental data for the coastal regions of Qatar. Based upon the projected [+] 1 – 3m sea level rise teams conducted extensive pedestrian based surveys of coastal areas within the north-western region of Qatar. As well as noting the location, nature and extent of possible

[15] Guerin & Al Naimi 2009

prehistoric sites, teams also noted geomorphological features such as marine sediment deposits, relict coastal features and flint beds all factors known to be linked to the presence and development of prehistoric populations.

From this data the initial projections of the coastline (Fig. 4), which was initally based on a variety of aerial photography, satellite imagery, geological and topographic data could be refined using survey and ground truthing. In turn based upon previous paleoenvironmental work and excavation within *Wādī Debayān* provisional 'landscape characterisation' models were produced of the prehistoric costal environment. From these sites were considered within their environmental, topological and chronological context. Such models can also be used to model past population's behaviour and form part of the parameters or landscape signatures by which further sites may be located.

Discussion and further research potential

Technological advances within a range of disciplines associated with archaeological research over recent decades have enabled a much wider range of detailed information to be produced regarding past environments. In particular the development of satellite imagery and the incorporation of Geographic Information Systems (GIS) have enabled field archaeologists to rapidly acquire, analyse and project a wide spectrum of complex data[16]. Similarly the use of a range of coarse and fine resolution surveying techniques such as GPS mapping and UAV technology, allows for detailed analysis of the spatial distribution of feature classes or monuments. Sites can be projected against the underlying topographical, geological, and hydrogeological landscape, coupled with a chronological framework provided by a variety of absolute and relative dates produced through excavation results from key sites. This provides a robust tool for analysing the development of the historic landscape within the framework of environmental and geomorphological influences. Using this dataset, we can begin to query the relationship between the construction of specific monument types and underlying factors such as resource accessibility, transportation networks, and line-of-sight analysis. Furthermore, we can begin to develop a meaningful typology of feature classes within Qatar and the potential relationship between monuments from different chronological periods in terms of influence and cultural connections.

Over the past three decades, "landscape" has become an umbrella term to describe many different strands of archaeology. From the processualist study of settlement patterns to the phenomenologist's experience of the natural world, from human impact on past environments to the environment's impact on human thought, action, and interaction, the term has been used[17]. This ambiguity to some extent branches in part from the very idea of 'landscape' in current society and from the technological and theoretical basis from which the field developed. Landscape Archaeology as with any discipline has both advantages and disadvantages over other archaeological methods. The power of GIS, as with other computer programs, can be deceptive: visually impressive but ultimately meaningless results can appear unassailable because of the sophisticated technologies used to produce them[18]. A concept similar to that raised by Thomas[19] concerning an erroneous belief that can potentially arise in GIS-led landscape surveys: that 'data assembled are data understood'. The apparently 'totalising knowledge' that emerges from the assembly of structures, fields, hydrology, soils, elevation and extant archaeological evidence into a GIS does not directly lead to an understanding of the all-important social landscape[20].

Landscape is, therefore, not a static background against which human dramas are played out, but an underlying catalyst. How prehistoric societies adapted and transformed reflects not only cultural adaption and communication, but climate, geomorphology and topography and how landscape has an intrinsic influence on the nature of the society which develops within it.

16 Conolly & Lake 2006
17 David & Thomas 2010
18 Eiteljorg 2000
19 Thomas 1993
20 Conolly & Lake 2006

Acknowledgements

We would like to thank H.E Shaykha al-Mayassa bint Hamad bin Khalifa Āl-Thāni (Chairperson of the Board of Trustees for the Qatar Museums) and H.E. Shaykh Hasan bin Mohammed Āl-Thāni (Vice-Chairman of the Board of Trustees for the Qatar Museums) without whose support the Qatar Remote Sensing and National Historic Environment Record Project would not have been possible. We would also like to express our gratitude to Mansoor bin Ebrahim Al Mahmoud (Chief Executive Officer, Qatar Museums). We would also like to thank Saif Al Naimi, Fatima Qassim Merekhan, Noora Khalaf Al-Hemadi, Ibrahim Al-Mansouri and Abdul-Aziz Al Mararfi for project support, and all the QNHER team.

Bibliography

Conolly, J. & Lake, M. (2006). *Geographical Information Systems in Archaeology*. Cambridge Manuals in Archaeology. Cambridge University Press, UK

Cuttler, R; Al-Naimi, F & Tetlow, E. (2011). Assessing the value of palaeoenvironmental data and geomorphological processes for understanding late quaternary population dynamics in Qatar in *Proceedings of the seminar for Arabian Studies*, 41 (2011): 1-14. Archaeopress, Oxford, UK.

Cuttler, R. (2013). Considering marine transgression as a mechanism for enforced migration and the littoral Gulf ʿUbaid phenomenon. *Arab. Arch. Epig*. 24, 37-43. John Wiley & Sons, Singapore.

Cuttler, R. & Al-Naimi, F. A. (2013a) From Land-Locked Desert to Maritime Nation: Understanding Taphonomic Processes and Landscape Evolution in Qatar and the Arabian Peninsula from 14,000BP. *Adumatu*, 22, Riyadh.

Cuttler, R., Tetlow, E., and Al-Naimi, F. (2013b). Typological and chronological variation of burial in Qatar: ʿUbaid to late pre-Islamic. *Proceedings of the Seminar for Arabian Studies* 43: 1-12.

David, B. & Thomas, J. (eds.) (2010) *Handbook of Landscape Archaeology* (World Archaeological Congress Research Handbooks in Archaeology). Left Coast Press, California, USA.

de Cardi, B., (ed.) (1978). *Qatar Archaeological Report: Excavations 1973*. The Qatar National Museum, Oxford University Press, Oxford.

Eiteljorg, H. (2000). The compelling computer image: a double-edged sword. *Internet Archaeology, 8.* http://intarch.ac.uk/journal/issue8/eiteljorg_index.html (accessed 18/07/14)

Fleitmann, D., Matter, A., Pint,J.J. & Al-Shanti, M.A. 2004. The speleothem record of climate change in Saudi Arabia: *Saudi Geological Survey Open-File Report SGS-OF-2004-8*, [Unpublished].

Glennie K.W. & Singhvi A. K. (2002). Event stratigraphy, paleoenvironment and chronology of SE Arabian deserts, *Quaternary Science Reviews*, 21, 853-869.

Glob P. V. (1957). Oldtidsfund i Qatar, *Kuml*, 167-174.

Guerin A. & Al Naimi F.A. (2009). Territory and settlement patterns during the Abbasid period (ninth centry AD): the village of Murwab (Qatar). *Proceedings of the seminar for Arabian Studies*, 39: 181-196. Archaeopress, Oxford, UK.

Inizan M-L. (1988). *Préhistoire à Qatar: mission archéologique française à Qatar vol. 2*. CNRS.

Kapel H. (1967). *Atlas of the Stone-Age Cultures of Qatar. Reports of the Danish Archaeological Expedition to the Arabian Gulf*. Aarhus University Press.

Lambeck K. (1996). Shoreline reconstructions for the Persian Gulf since the last glacial maximum. *Earth and Planetary Science Letters* 142, 43-57.

Sadiq A.M., & Nasir S.J. (2002). Middle Pleistocene karst evolution in the State of Qatar, Arabian Gulf. *Journal of Cave and Karst Studies* 64:2, 132-139.

Schreiber J; Daroczi T.T; Muhle B & Ewersen J. (2009) Excavations at Umm al-Mar, Qatar: A preliminary report on the second season 2008/2009. [Unpublished report]

Taylor J.C.M. & Illing L.V. (1969). Holocene intertidal calcium carbonate cementation, Qatar Persian Gulf. *Sedimentology*, 12, 69-107.

Thomas J. (1993). The politics of vision and the archaeologies of landscape. In Bender, B. ed. *Landscape: Politics and Perspectives*, pp. 19-48. Oxford, Berg.

Vita-Finzi C. (1978). Environmental History. In: De Cardi, B (ed.) *Qatar Archaeological Report: Excavations 1973*. Oxford University Press, Oxford. 11-25.

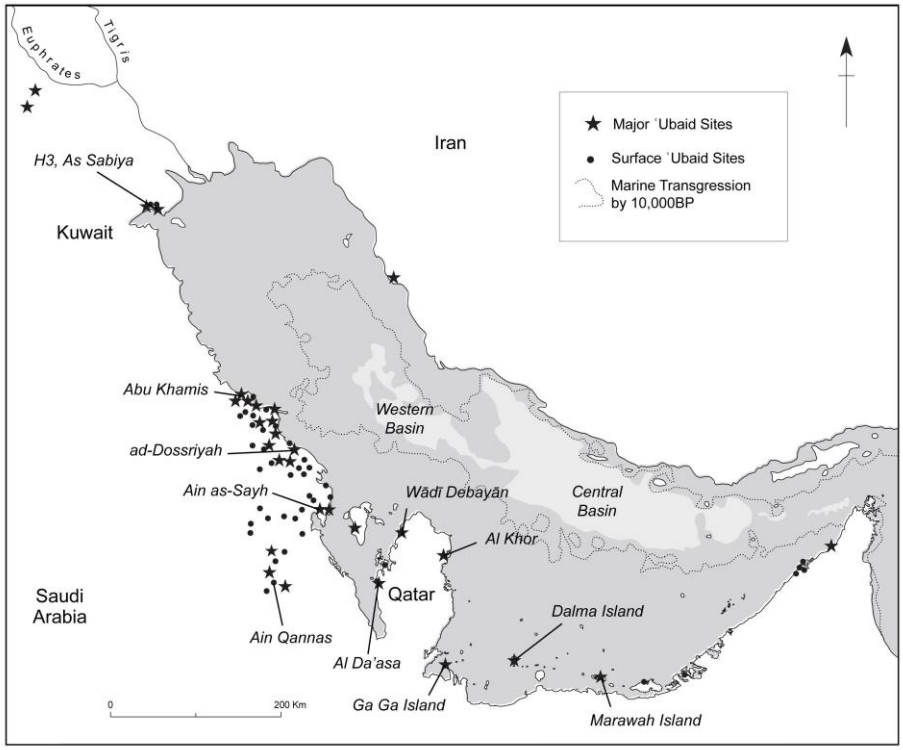

Figure 1: Location map of the western littoral Gulf region showing major ʿUbaid-related coastal settlement

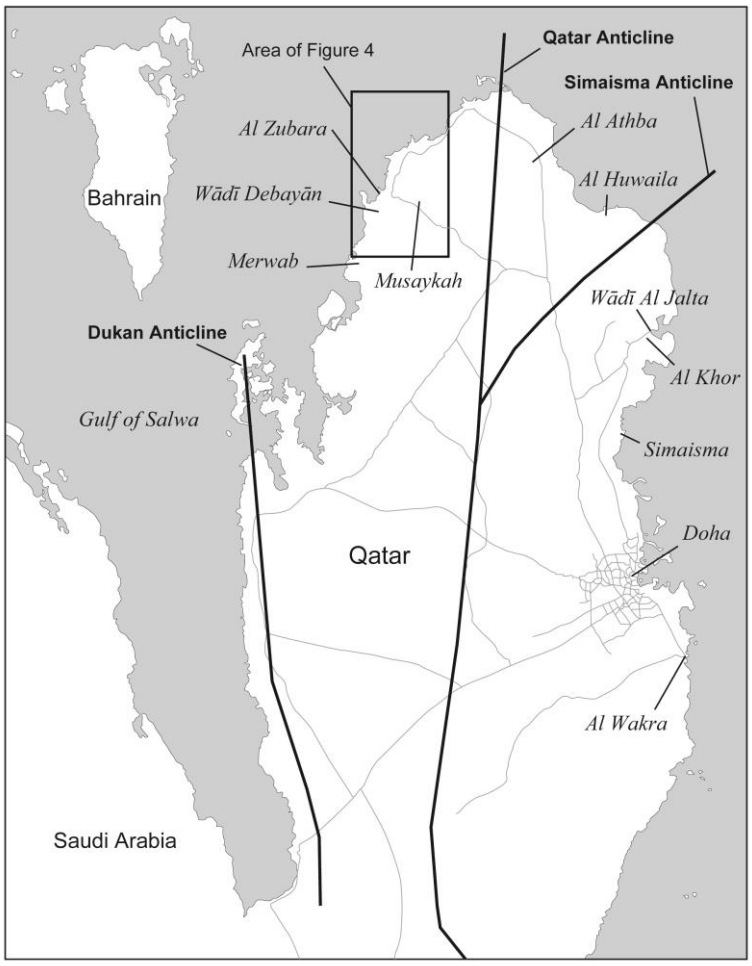

Figure 2: Geological features and sites mentioned in the text

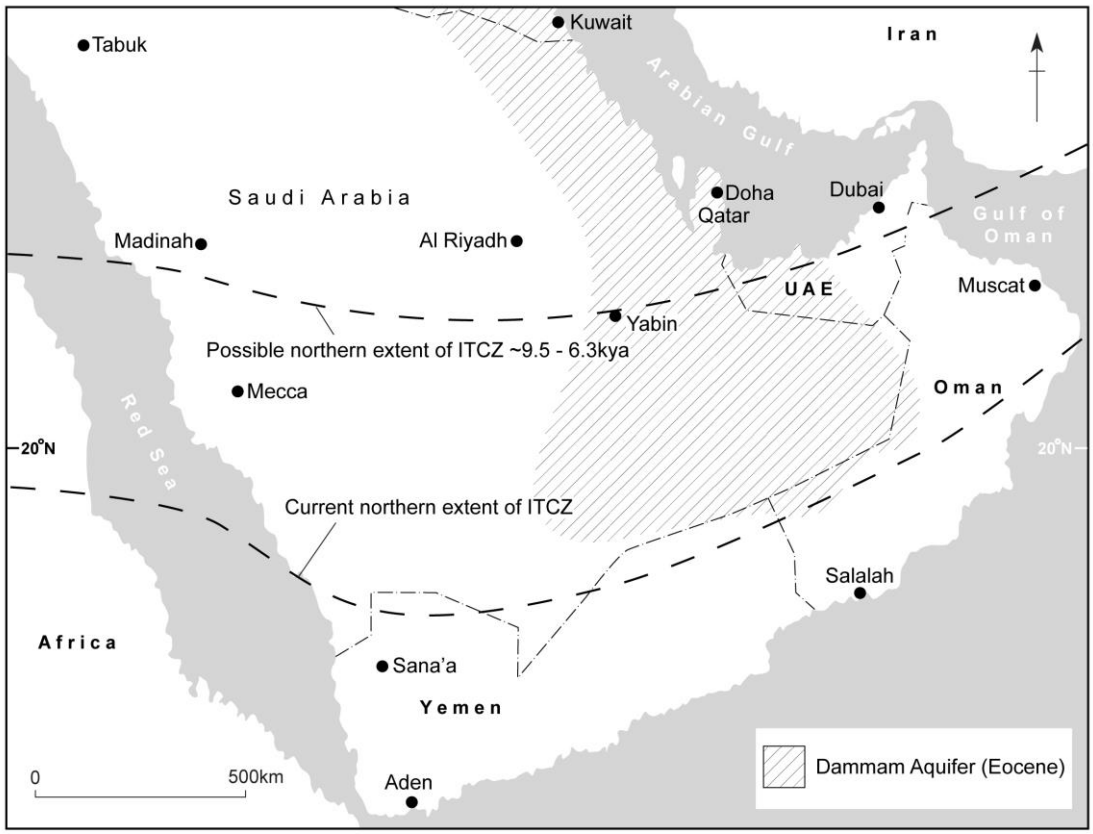

Figure 3: The projected advance of the ISM across the Arabian Peninsula during the early Holocene

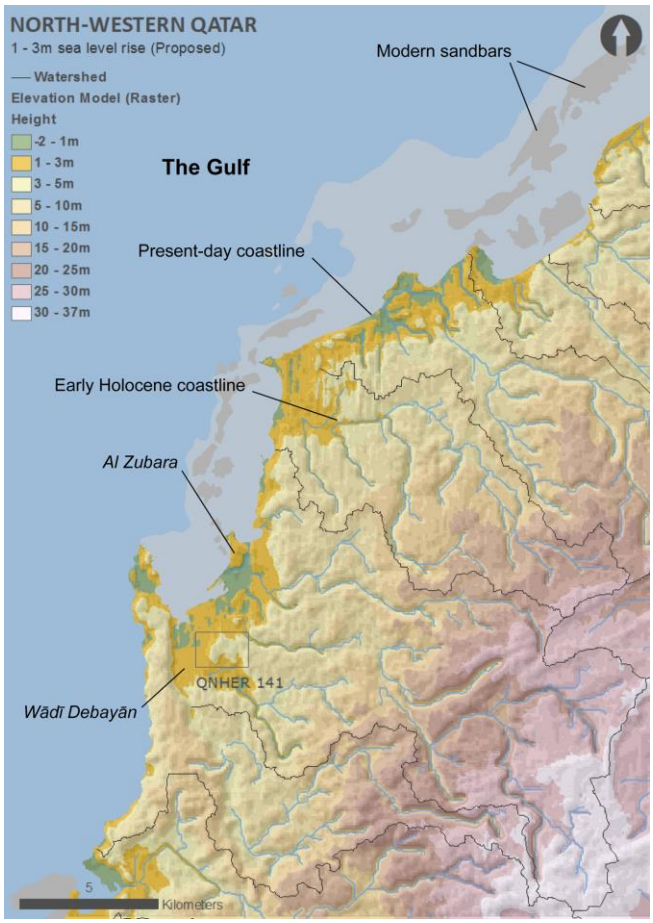

Figure 4: Elevation model of the northwest coast of Qatar showing water catchment areas (watershed) and the predicted effect of the mid Holocene 1 – 3 metre sea level rise