



# Arish: Palm-Leaf Architecture

Thames & Hudson

Sandra Piesik



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**Celebrating the 40th Anniversary  
of the United Arab Emirates National Day**

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## Foreword

Climate change is high on the agenda. People all over the world now recognize the importance of sustainability in construction and the benefits of harmony with nature. Interestingly, the date palm-leaf architecture found throughout the Emirates mastered these concepts centuries ago.

The date palm tree is deeply connected to our Islamic civilization through religion, culture and agriculture. Our people responded to the challenges of the local climate by designing simple but sophisticated buildings and annexed structures. Using clever technical innovations and the materials to hand, their designs also celebrated the social and cultural traditions of the Emirates.

*Arish: Palm-Leaf Architecture* not only serves as an excellent reference book for both architects and students but also explains and illustrates the styles and principles of date palm-leaf construction, uniquely adapted to the different landscapes and available materials in each of the seven UAE Emirates.

*Arish: Palm-Leaf Architecture* is the first comprehensive publication dedicated to recording the special place of date palm-leaf architecture in the UAE's cultural heritage.

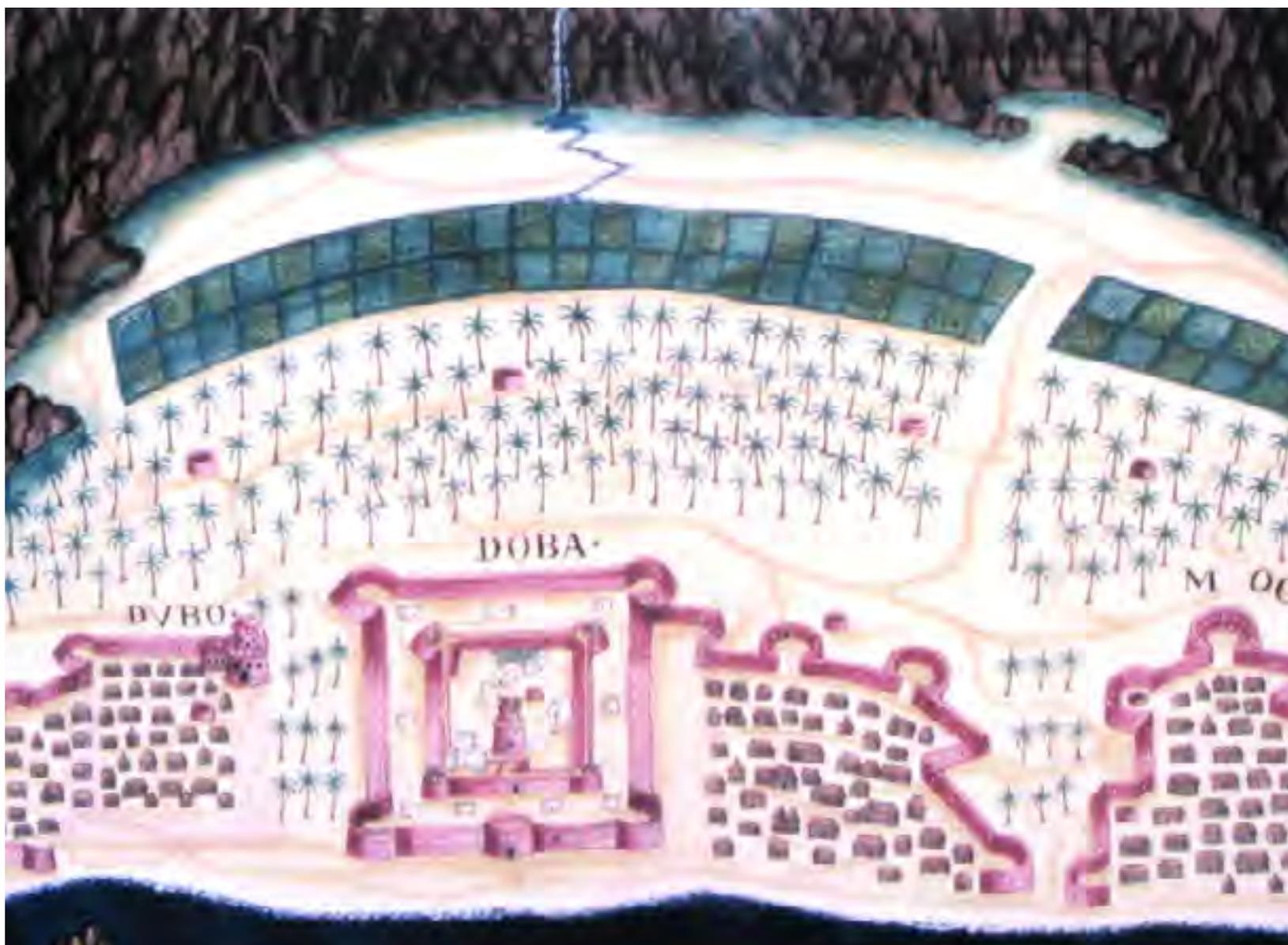




## Introduction

Cultures disappear, for reasons that we do not always readily understand, perhaps because the human race is so diverse and the mechanisms of economics vary so considerably from one culture to another. It may also be that if a culture is uprooted from its context, then the process of disappearing begins. The first context of any culture is formed by the climate and the land and the second by basic human needs such as shelter and food. In this work, we understand UAE culture in this context.

According to 21st-century theories of cultural definitions, human intelligence is equal within all societies, whether indigenous or urbanized. If a banker from the City of London were to live in the Rub Al Khali desert, he or she would most probably not come up with any other ideas for surviving than those of the Bani Yas tribespeople. The story of Arish in the Emirates is a perfect example of optimal human intelligence applied to the best use of locally sourced material in a hostile environment.



Dibba, c. 1635.  
 Dibba was, after Muscat and Suhar, the largest Portuguese establishment along the Gulf of Oman. Around the bay there were three villages. The most important was a fortified place in the centre (Dibba Hisn) next to a fortress, with a double wall surrounding khaimah houses

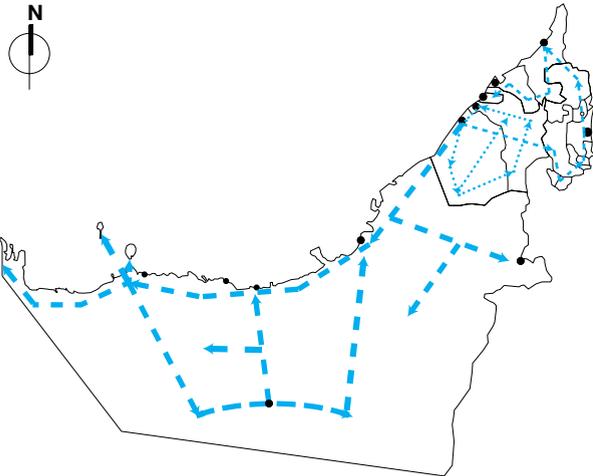


**United Arab Emirates satellite map**



**[above] Map of the United Arab Emirates'**

## The author's journeys in the UAE



- — — — — Journey 1: Abu Dhabi Emirate
- ..... Journey 2: Eastern and northern Emirates
- . - . - . Journey 3: Dubai and Sharjah Emirates

The wealth and breadth of Arish use in the history of the UAE, particularly among the Bedu, is extraordinary. However, today, owing to complex and ultimately insuperable economic factors, palm-leaf buildings have almost completely vanished. The Arish research project is aimed at capturing the very last moments of tangible Arish heritage before it disappears altogether. Yet there is hope. There are people living whose memories represent an intangible heritage. We have perhaps ten or, at most, twenty years left in which to commit these memories to an Arish archive and thus capture the legacy of generations of UAE cultural identity.

This study also focuses on the pressing question of how to interpret cultural heritage in the built environment today and how to find an appropriate language for projects that do not imitate but create and inspire. It forms an integral part of the Eco-Arish Building Prototype Project based in the Moughab Fort in Liwa, which is seeking a means of ensuring authentic cultural continuity.

The Arish research project is gathering historical evidence of Arish architecture from archive photographs and the contemporary use of Arish in a typical form. In this book, I have attempted to analyse and define the characteristics of Arish typologies in each region, partly by drawing on interviews with notable individuals.

In the course of this work I have travelled extensively across the UAE, made site visits, recorded interviews, worked directly with staff of the Abu Dhabi Authority for Culture and Heritage (ADACH) in Al Ain to create experimental Arish structures, and conducted library and, where appropriate, internet research. To the best of my knowledge, this book represents the first published research on palm-leaf architecture in the country.



Construction of a khaimah  
palm-leaf house, 1960s

1

# History of Arish: Photographic Overview



Travelling through Abu Dhabi or Dubai today, one marvels at modern cities being constructed at an astounding speed. It is difficult to believe that only fifty years ago the typology of these cities was quite different and that most of the buildings were constructed out of palm leaves.

Historical evidence of Arish, or palm-leaf architecture, as found in texts, maps, diagrams and photographs, recalls unique cities that once contained more than two thousand palm-leaf houses, numerous palm-leaf villages, such as at the Liwa Oasis at the edge of the Empty Quarter, and individual palm-leaf houses, such as those depicted in Ras Al Khaimah.

The authentic heritage of Arish craft in the United Arab Emirates is, sadly, verging on extinction. However, the knowledge and skills still exist among a handful of elderly people, whose recollections of constructing and living in palm-leaf houses offer the chance to save the tradition before it is too late.

Other sources of evidence include the photos taken by the British explorer Wilfred Thesiger between 1945 and 1950 and by commercial companies that came to the Emirates in search of oil, notably BP. Thesiger's photos are now in the collections of the Pitt Rivers Museum at the

University of Oxford. Other valuable sources include the Royal Geographical Society (with IBG) in London, BP's photographs in the BP Archive at the University of Warwick and the Abu Dhabi Company for Onshore Oil Operations (ADCO). In addition, personal collections, such as those of Dr Sultan Al Qassimi of the Centre of Gulf Studies in Sharjah and of researchers such as Dr Anne Coles, yield further fascinating photographs.

Thanks to the work of archaeologists, the story of palm-leaf architecture can be put into a much longer time frame. Carbon dating of date stones uncovered during excavations in Ras Al Khaimah (one of the northern Emirates) shows them to be four thousand years old. Eighteenth-century iconography depicts the Portuguese presence in the Emirates and settlements of palm-leaf houses, locally called khaimah. Remarkably, a house excavated at site 11 on Delma Island by Dr Mark Beech and Elizabeth Shepherd proves that the history of palm-leaf architecture in this region and in south-east Arabia goes back at least seven thousand years.

# Liwa



Liwa, Arish settlement,  
November–December 1948



Shah village, Liwa, 1950–60





**[left] Liwa, Arish settlements  
in the background,  
November–December 1948**

**[overleaf] Typical palm-leaf  
house in Liwa with a curved  
element within a fence,  
unique to this region,  
November–December 1948**





# Al Ain and Buraimi



Buraimi Oasis, April 1948



Buraimi Oasis,  
February–April 1949

[overleaf] Buraimi Oasis,  
Jebel Hafeet in the  
background, April 1948







[above and opposite below]  
Buraimi Oasis, April 1948



[above] Construction of a palm-leaf house, 1960s

# Abu Dhabi



Abu Dhabi, 1953





[opposite] Abu Dhabi, March 1967

[below] Abu Dhabi, October 1962



# Fujairah



Fujairah Castle in 1941



# Ras Al Khaimah





**[left] Arish Mogassas – winter house in Ras Al Khaimah, 1925**

**[below] New Agricultural School in Ras Al Khaimah, February 1959**





**Ras Al Khaimah, Baluchi  
houses from the 1970s,  
representing interesting  
use of palm leaf for curved  
surfaces**



# Sharjah



Sharjah, 1930s

Souk in Sharjah, May 1948



Dubai





[left] Dubai in 1950, then a settlement comprising many palm-leaf houses

[above] Dubai in 1950





Dubai in 1950, showing typical palm-leaf houses locally called khaimah



**[above] Palm-leaf houses  
next to Dubai Creek in May  
1948**



**[left] Scene from Dubai  
Creek in May 1949, delivery  
of daan mats (prefabricated  
building components) on a  
donkey**



Dubai, May 1949. Framework for wind towers constructed annually before the summer



2

# Palm-Leaf Architecture of the Emirates



**Our world perception is much shaped by the media, which unfortunately seldom celebrate cultural diversity. Arab countries extend through three continents, from Africa to the Middle East and the Arabian Peninsula and into Asia. United by faith and language, they nevertheless represent different regional cultures, which developed first and foremost in direct response to the geography and climate. Particularly in the arid deserts, local geology and the presence of ground water were the main determinants of the form of a basic shelter.**

**This survey of the seven Emirates uncovers a fascinating diversity in palm-leaf architecture, varying from one region to another and exemplifying what economists call ‘hyperregionalism’. Differences in architectural response arose from the distinctive landscapes of the Emirates, from the profoundly beautiful landscape of the desert in the Liwa Oasis at the edge of the Rub Al Khali (the Empty Quarter) to the Al Hajar mountains and the coastal areas.**

**The harsh summer climate in these empty landscapes demanded adaptability and two types of houses, one for winter and one for summer, were the norm, the latter constructed during summer migrations. Coastal city dwellers developed their own solutions for surviving the**

heat of summer in the form of summer extension houses with wind towers for cooling, even within the same settlement.

Social structures constituted yet another layer of regional diversity. The importance of belonging to a tribe was and still is one of the most striking features of Arab society.

Names of palm-leaf buildings vary too: a palm-leaf summer house called 'Arish' in Hatta looks different from a house of similar purpose constructed in Ras Al Khaimah.

Despite so many facets of regional diversity, there is no doubt that the spatial organization of houses and settlements in its respect for Islam is uniform throughout the entire region.

# Abu Dhabi Emirate

The landscape of the United Arab Emirates divides naturally into two regions: the mountain range on the east coast and the north and the desert areas. Sand dunes cover 74 per cent of the area of the Emirate of Abu Dhabi. Where the land meets the Gulf, coastal sediments predominate. Rub Al Khali desert and the eastern edge of Al Hajar volcanic rock mountains form the southern boundary of the Emirate and Shabkhat Matti stretches away on its western border. The Western Region of the Emirate is a harsh and unforgiving environment, devoid, in some areas, of all fauna and flora.

The UAE's geology and climate are relevant to palm-leaf architecture because they impact on the growth of palm trees. Throughout hundreds of square kilometres of the desert plain between Liwa and Tarif, there are no natural plantations or forests. Drifting sand dunes, wind and exposure to a blistering sun are not conducive to the growth of any kind of vegetation.



There are only two areas in the UAE, Liwa and Al Ain, that are natural valleys in essentially flat terrain. They were natural oases, created by the presence of groundwater, permeable soil and the lie of the land. Both oases have similar geological conditions, with areas where the high water infiltration rate is conducive to the growth of palm trees, and other areas that prevent the growth of vegetation (the Rub Al Khali desert in Liwa and Jebel Hafeet in Al Ain).

### Tribal society

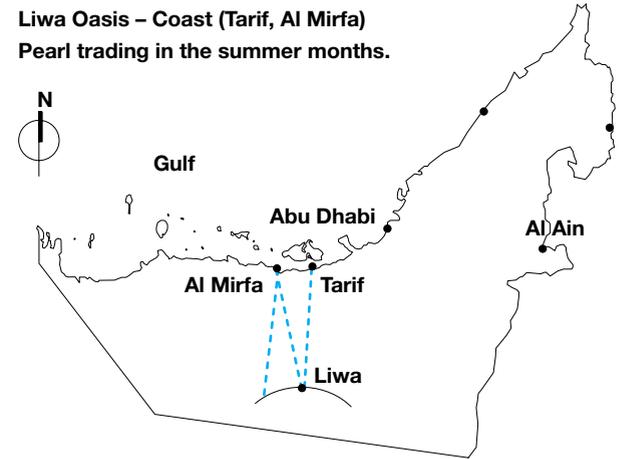
Two main factors governed general patterns of migration in the region. One was climatic. In the extreme heat and humidity of the summer months, people commonly migrated from the coast to inland areas where there was fresh water. The other was economic. Migrations occurred seasonally from Liwa to the coast, where the men could earn money for food by catching pearls. As people acquired wealth, they migrated from the coastal areas of Abu Dhabi to Al Ain, where they were able to buy land with much better groundwater quality.

### Economy

There were three main sources of income for the traditional Bedu communities: camel farming, date cultivation and pearl diving. The climate and geology did not allow further cultivation. The story of palm-leaf architecture is closely related to the economy and way of life of the people: we can distinguish basic architectural forms such as houses and shelters for animals, in particular camels and goats. Animal shelters remain in use today and are to be found especially in and around the areas of Liwa and Al Ain.

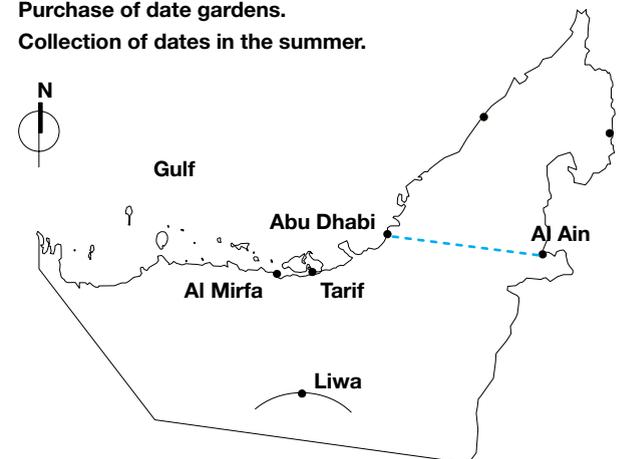
#### Migration:

Liwa Oasis – Coast (Tarif, Al Mirfa)  
Pearl trading in the summer months.

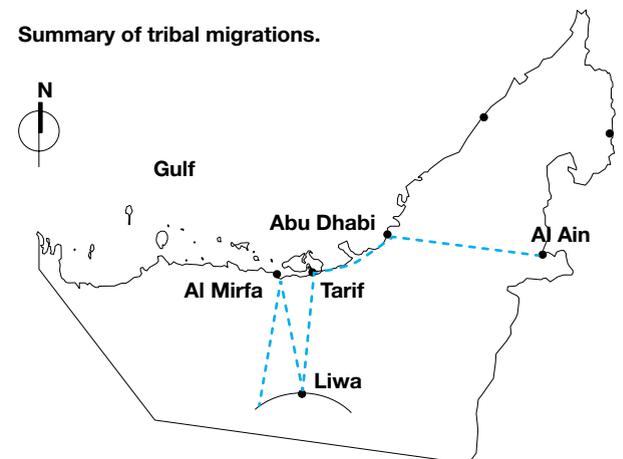


#### Migration:

Abu Dhabi – Al Ain  
Purchase of date gardens.  
Collection of dates in the summer.



#### Summary of tribal migrations.



## Migrations Before and After Discovery of Oil<sup>2</sup>

### Bani Yas Tribe

In 1908

12,000 people of whom 10,000 were settled and 2,000 were nomadic (Bedu)

2,800 settled in Abu Dhabi – 466 houses\*

2,000 settled in Dubai – 333 houses

5,000 settled in Liwa area – 833 houses

Other areas of settlements: Buraimi Oasis and coastal villages

\* 6 people in the household

In 1950

The total number had decreased to:

8,000 settled

1,700 nomadic (Bedu)

In 1968

The total number had decreased to:

5,884 settled

Different sources provide different information as to the number of sections within the Bani Yas tribe, varying from 6 to 20. For the purpose of understanding the population living in the Arish settlements the following groups have been taken into account:

1908

Al Bu Fa'lah (Al Nahyan) – spent winter with the camels in the desert and in the summer went pearling. It was the first Bani Yas tribe to acquire property in Buraimi Oases.

1950

Al Bu Mahair

Houses owned:

35 Abu Dhabi, 20 Buraimi, 300–400 Dubai, 60 Sharjah

Rumaithat

100 houses in Abu Dhabi

Qubaisat

Pearling industry (40 boats)

1950 – 40–50 houses in Liwa

Mazari (Mazrui)

1908 – 315 houses in Liwa

1951 – 142 families (divided by 6 = 23 houses)

1956 – 151 families (divided by 6 = 25 houses)

Marharibah

1908

Houses owned:

150 Liwa, 60 Abu Dhabi, 50 near Abu Dhabi

In summary:

In 1908 we could estimate the following number of houses

Abu Dhabi

2,800 settled in Abu Dhabi

466 houses of which:

35 - Al Bu Mahair section of Bani Yas tribe

60 - Marharibah section of Bani Yas tribe

Liwa

5,000 settled in Liwa area

833 houses of which:

315 - Mazari (Mazrui) section of Bani Yas tribe

150 - Marharibah section of Bani Yas tribe

1950s

Liwa

25 houses - Mazari (Mazrui) section of Bani Yas tribe

50 houses - Qubaisat section of Bani Yas tribe

Approximately 75–100 or more houses

2009 None of the Arish houses remains.

# Liwa and the Western Region

The far Western Region of Abu Dhabi, with its coastal and island sabkhas, or salt flats, is inhospitable for the formation of oases. Palm leaves are used in the areas of Madinat Zayed and Ghayatri, mainly for fences or shading devices. In the Western Region there are few remnants of Arish craft but they demonstrate that the material can be used for larger structures. Wire and rope are used to connect the palm leaves with wire mesh as a support. The most significant example of Arish found in the Western Region is the Baynunah Poultry Farm, where Arish is used for shade shelters for animals and to define boundaries, in the form of fences.

South of the Western Region and Madinat Zayed, the landscape slowly changes from sabkhas to sand dunes, marking the edge of the Rub Al Khali, one of the largest sand deserts in the world. Called the Empty Quarter in English, it has a harsh and unforgiving climate. Among the very few Europeans who have succeeded in crossing the desert was the British explorer Wilfred Thesiger, in 1946–47 and again in 1948. During the second crossing, Thesiger recorded through photographs the Liwa Oasis, where the geology of the area provides access to bitter but drinkable water. It was the presence of this drinkable water 200 kilometres away from the sea that allowed Bedu from the Bani Yas tribe to settle here, where for centuries cultivated palm trees were a source of food and the only source of material for building construction.

## Bedu community architecture

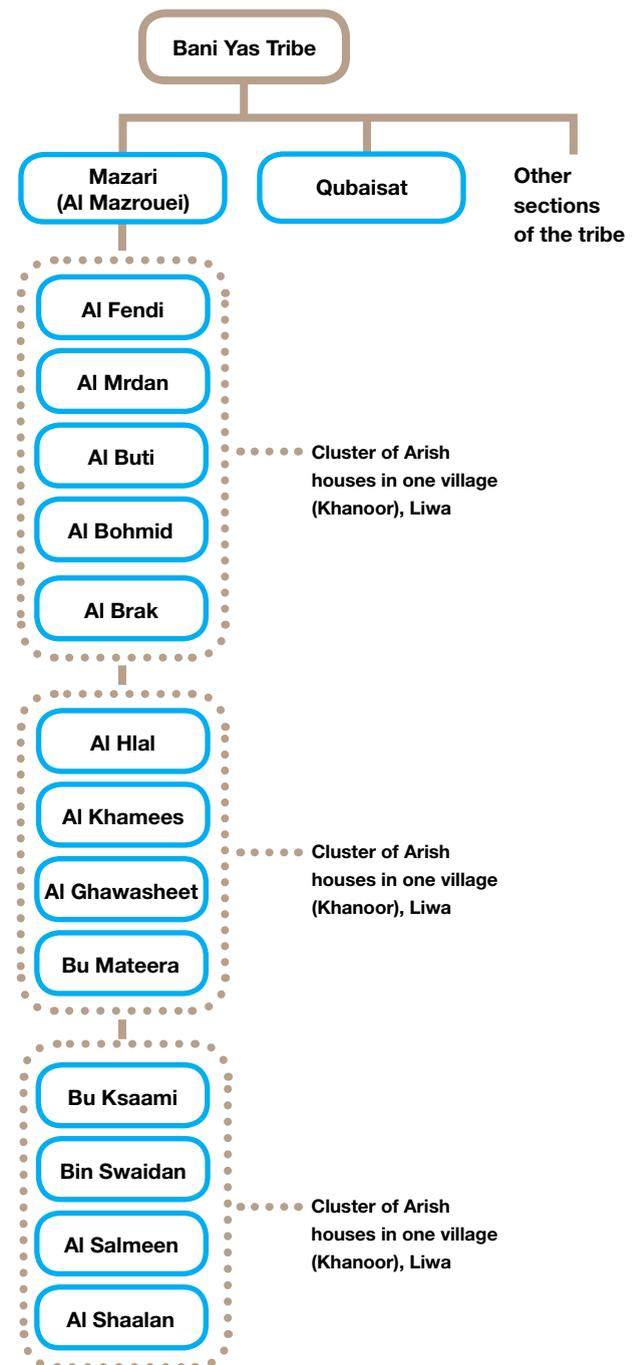
Dried palm leaves, palm trunks and rope made from palm trunk fibres were the materials that were employed so creatively in the building technique called Arish: houses constructed from palm leaves. The houses were built by women while the men were taking part in the summer migration to the coast to earn an income. Records of population from 1908 indicate that Liwa Oasis had around eight hundred palm-leaf houses at that time.

Their 'urban' or desert typology demonstrates one of the most important aspects of Arab society: the belonging of a person or a family to a tribe. On photographs taken by Wilfred Thesiger, we see groups of five or six houses forming clusters, where individual families lived. A mother, a father and children would form a single family unit. When a son married, he would construct a house for himself in the neighbourhood. When a daughter married, she left the household and went to live with her husband. According to Muslim custom, a son-in-law was not allowed to live in the childhood house of his wife and would be able to visit only a designated area for men in it, called the majlis. In Liwa, the men would work during the day and at night quite often slept outside on the sand.

Today around fifty villages remain in Liwa. Similar spatial differentiation can still be seen in other parts of the Emirates, including the coastal cities, and the social custom of separation between men and women within households is still widely respected.

## A typical Liwa house

Our information about Arish houses in Liwa comes primarily from photographs Wilfred Thesiger took in 1948, in particular his photograph of Shah village (see page 59). Analysis of this photo has helped historians to understand the household dynamics of the time. It also formed the basis for the reconstruction of this house in the spring of 2010, representing the first time in forty years that this building typology, so deeply embedded in the landscape and culture, has returned to the Liwa Oasis and the Empty Quarter.



A diagram showing the number of families from Al Mazrouei tribe in one typical village settlement in Khanoor, Liwa.<sup>3</sup>

[opposite] Typical village settlement in Liwa, November–December 1948



The reconstruction, initiated by the author, was carried out by the community, echoing the way in which houses or even entire cities were built in the past by a family, neighbourhood or local community. The involvement in the project of Bedu women from the Al Mazrouei tribe, notably Fatima Khamis Al Fendi Al Mazrouei, the director of Liwa Municipality, Hassan Suhail Al Mazrouei, the Liwa Municipality staff, Peter Sheehan and the Abu Dhabi Authority for Culture and Heritage was invaluable.

The process of reconstruction has demonstrated the profound understanding the indigenous people had of the climate. The orientation of the house is east–west. Historically, an area for evening prayer was set aside on the western side of the settlement. The close proximity of four enclosures, with a distance of about a metre between them, provided thermal mass and shade.

The entire house was constructed from readily and locally available materials: palm leaves that were cut annually to allow date palm growth and pollination, palm trunks for structural support and trunk fibres woven into rope to connect building components together. All the elements were prefabricated, including walls, roofs and doors. Leaves were formed into mats known as daan mats, which would have been rolled up for transport or stretched prior to construction and used in single or double layers for the walls and, in the winter months, for insulation. Smaller leaves were woven into special mats called hassir mats.

The first and foremost function of the house was to provide shade. On 22 July 2010, the temperature of the sand at 1.30pm was measured at 77°C, whereas the temperature inside the Arish houses was 54°C. This means that the houses could provide significant cooling and a relative level of comfort year-round, except during the summer. The distances between buildings and the placement between the walls of hassir kept out the tiny sand particles blown on the wind during sand storms. Palm leaves also offer good reflectivity of sunlight. On 23rd April 2011, the sand temperature at 11.30am was 71°C, whereas the double daan mat wall recorded a temperature of 45°C.

Naturally, houses also served to enhance social cohesion and respect for culture and religion. Of the four enclosures into which each house was divided, one, the majlis, was dedicated for men only, two were for women and children and the fourth was a kitchen. In a changing society, Emirati families still take heed of these cultural considerations.



A typical Arish house in Liwa, drawn by Fatima Khamis Al Fendi Al Mazrouei. Traditionally, Arish houses were constructed without drawings; this drawing has been produced only for the purpose of the Arish house reconstruction.



Small Family House

Large Family House

Toilet

Bathroom

Men's Room

Women's Room

Children's Room

Kitchen

Typical Arish house, Shah  
village, Liwa, November-  
December 1948

### Other architectural elements in the region

Curved geometry, as expressed in both roof structures and elements of fences, as illustrated, formed a distinctive architectural element in the Liwa Arish settlements. This geometry is unique to Liwa and may be due to the influence of the desert landscape.

This particular element may have been oriented towards Qibla (the direction of Mecca) for daily prayers. Bedu women would place the date palm fronds in the sand to soften them and thus enable the builders to bend them for increased flexibility.

For fence construction, plain fronds of palm leaves were linked horizontally with a few members at the height of around 2.1 m above the ground, for structural stability. The fronds were connected together with a rope that offered a secondary support. In authentic Bedu fences the top 50–70 cm of the palm fronds was not cut or trimmed but left intact, sometimes with their leaves still on.

Today, palm fronds are used for fences of date gardens to define a boundary, but not in the traditional Bedu way; these fences are trimmed at the top, bearing little resemblance to the way Arish was put together over the past 300 years in the Liwa region. There is, however, scope for creativity and some modern fence typologies are aesthetically pleasing. Palm fronds are also used as shades for car parks and water tankers.

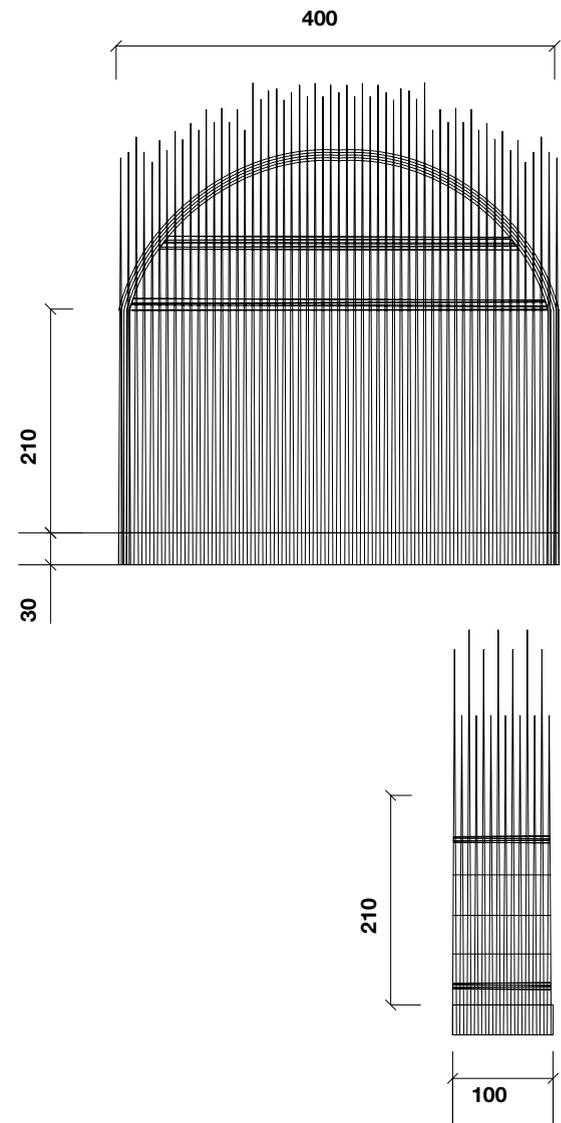
### The Arish heritage in Liwa

It is hard to comprehend the speed with which authentic Arish heritage has disappeared from the Liwa region. People from the Al Mazrouei tribe and other sections of the Bani Yas continue to come to Liwa in the summer for the date harvest. Some still visit Liwa at weekends. The Western Region Municipality is making commendable efforts to provide a civic infrastructure for Liwa's inhabitants and visitors.

Within the next few years there will be the opportunity for further anthropological research to record the memories of elderly Bani Yas, whose tribe extended from the heart of the Rub Al Khali desert into the rest of the Emirates. For hundreds of years they lived in tents and palm-leaf settlements. If the population of Liwa in 1908 was 5,000 people, we can imagine the entire desert plain filled with Arish houses and a flourishing society, based on respect and intimate knowledge of the environment.

The Liwa Oasis is one of the most extraordinary desert landscapes in the world. It is critical to provide paradigms of indigenous architecture in order to understand schemes so deeply connected to the land, climate and community from a historical, cultural and ethnographic perspective. The project featured in the Contemporary Applications chapter of this book, called the Eco-Arish building prototype in Liwa, offers such a paradigm.

There are no authentic Bedu palm-leaf houses left in Liwa, only the recent reconstruction. In the 1980s a few remained but, as Hamda Hazam Al Mazrouei confirmed during our interview, these houses were demolished when the main road was constructed.



[above] A typical fence in the Liwa area (measurements are given in centimetres)

[opposite above] A Bedu family with the palm-leaf house in the background, November–December 1948

[opposite below] First reconstruction of an Arish house in Liwa Oasis after 40 years



[opposite, top left] Arish house of Fatima and Rashad Al Mazrouei's farm in Madinat Zayed, January 2011

[other images]  
Reconstruction of a typical Arish house in Liwa, with architectural details unique to the area, April 2010





# Al Ain

## Tribal migrations – Arish settlements in Abu Dhabi, 1968

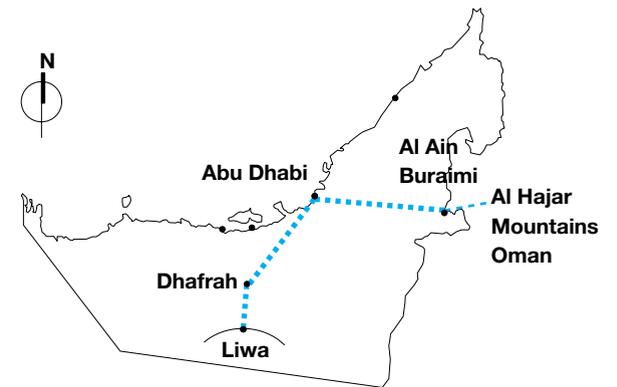
Al Ain is the second largest natural oasis in Abu Dhabi Emirate. The underground water falajes (manmade water channels) provided much better-quality water than in Liwa, while Jabel Hafeet mountain helped retain some of this water in the Al Ain valley. Five beautiful oases in the city offered plenty of material for the construction of palm-leaf houses.

According to Dr Frauke Heard-Bey's book *From Trucial States to United Arab Emirates: A Society in Transition* (2009, pp. 51–53) and interview, it was Zayed the Great's political and strategic mission to gain influence in the wealthy region of Al Ain.

The Bani Yas came from Liwa through Abu Dhabi to Al Ain and acquired influence in the area through intermarriage with tribes already residing there or by force. It was a subtle but persistent process that eventually succeeded in winning the loyalty of the Al Ain tribes to the ruler of Abu Dhabi, which remains intact today. There were also tribes residing in the area who came through Oman.

Trade played an important role in tribal migrations. Some Bani Yas Bedu would sell camels to acquire date gardens that yielded better crops of dates, thanks to water systems that were more sophisticated than wells drawing water from falajes. Some had income from pearl diving in Abu Dhabi and it was customary to purchase a date garden or a property in Buraimi Oasis. Al Ain had access to drinkable water. In 1897, Al Ain Oasis belonged to the Dhawahir tribe, which also owned the Hili, Jimi, Qattarah and Mutirid oases, whereas the Bani Yas tribe were settled at the Masudi Oasis. Satellite maps dating from 1968 show that certain oases were inhabited by a section of a tribe, living in a settlement of between 15 and 20 houses.

Arish settlements in the area grew because of the geology of the land, which formed a natural oasis, the existence of ground water and falaj systems, Bedu tribe migrations and possibly the sharing of palm-leaf construction craft with the south of the country.

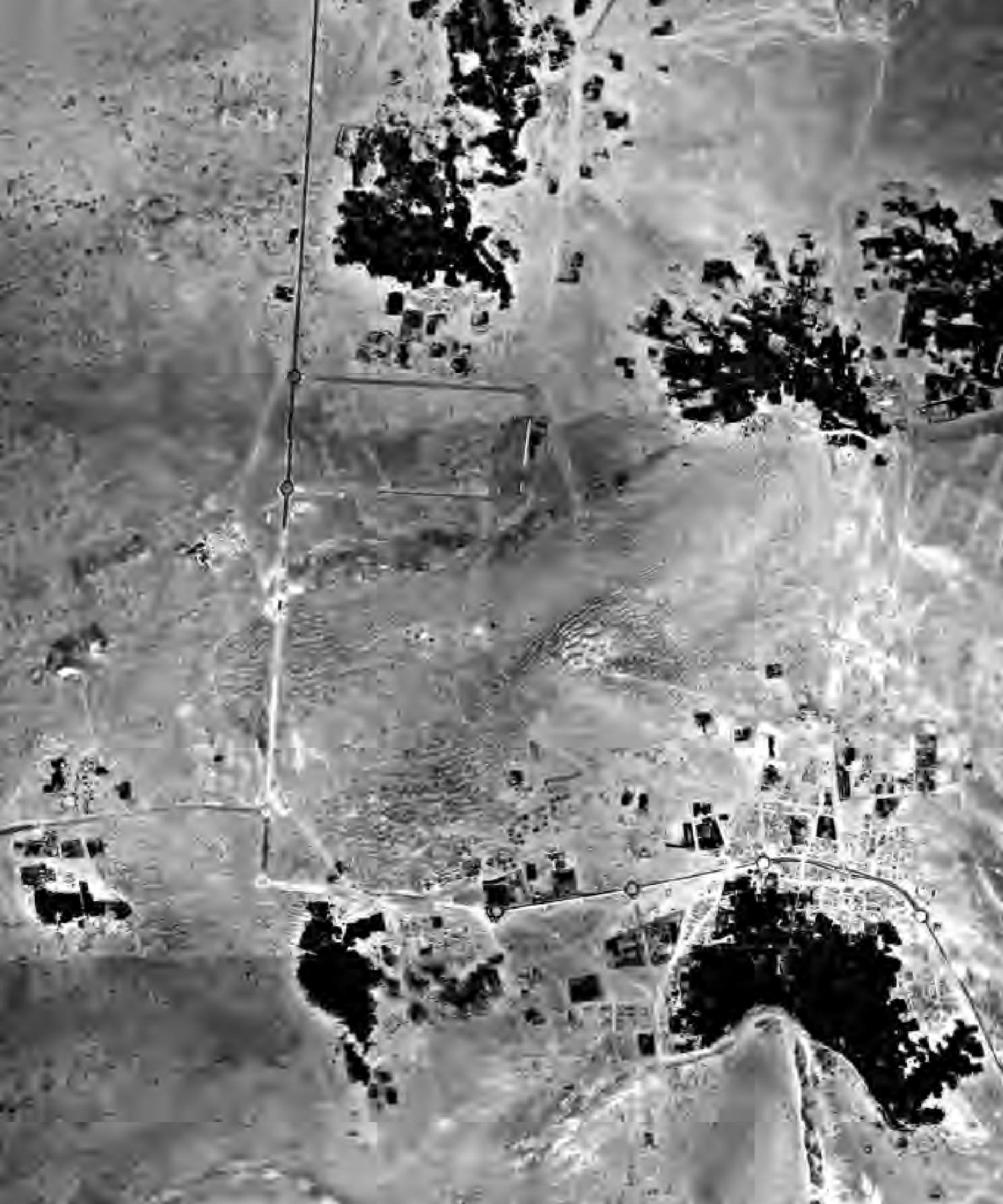


- ..... Primary migration route (UAE tribes)
- Secondary migration route (Omani, Yemeni tribes)



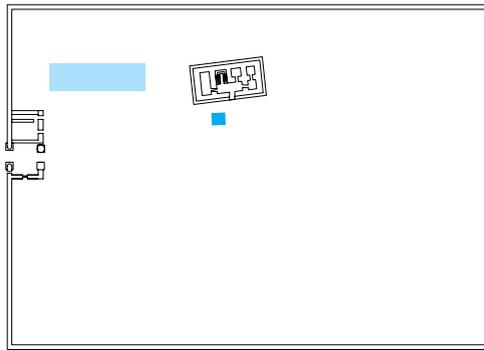
[left] Archaeological excavation of Bin Hadi house in Hili Oasis, Al Ain, with 17th–18th-century walls and holes – evidence of palm trunk use

[opposite] Al Ain, 1968





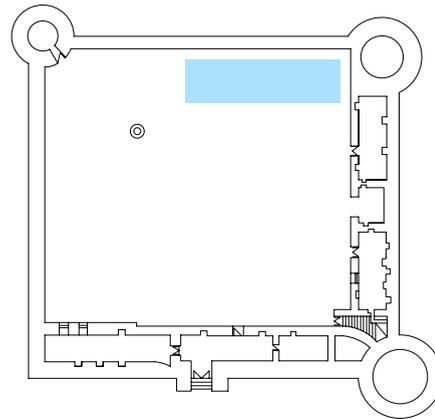
Plan of Al Murabbaa Fort, c. 1980, showing location of Arish structure



Location of Arish structure in 1980

Location of Arish structure in 1956

Plan of Al Sultan Fort, c. 1980, showing location of Arish structure

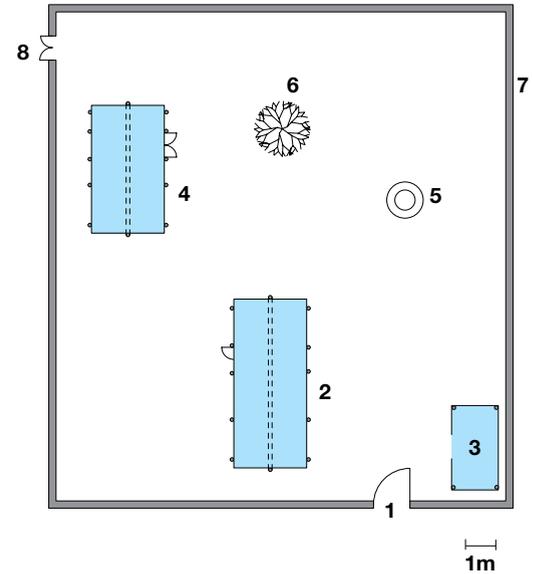


Location of Arish structure in 1980

### Arish structures in forts

There were only two forts in Al Ain that, by the 1980s, still had Arish buildings in their courtyards. They were Sultan Fort, built in 1910, and Al Murabbaa Fort, constructed in 1948. Adjacent to the Al Ain National Museum, Sultan Fort was the home of Sheikh Zayed the Great, who lived there with his family until 1922. Built of mud bricks, it was square in shape, with three towers, four rooms and a kitchen. The Arish enclosure (dismantled in 2007) was a fine demonstration of the quality of space that Arish buildings possessed, thanks to the partial transparency of the walls.

The construction of Al Murabbaa Fort commenced in 1948 on the orders of Sheikh Zayed. The fort was to accommodate a watchtower and headquarters for the royal guards. The Arish structure built in the 1970s or 1980s is the best example of surviving Arish architecture in Abu Dhabi Emirate. It is extremely skilfully done, with great understanding of the material. The level of craftsmanship is as good as in the Bani Yas tribe's houses in Liwa photographed by Wilfred Thesiger. The interior quality of the large spaces is almost theatrical: dark, yet lit by strips of sunlight gleaming through the beautifully woven walls and the pitched roof, which resembles a typical Arish house typology from the 1970s in Al Ain and Abu Dhabi.



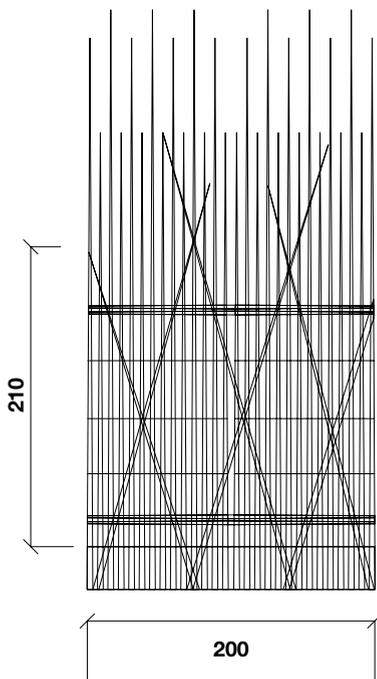
Al Ain household, 1970s

- 1 Main entry
- 2 Arish house for one family
- 3 Arish animal shelter
- 4 Kitchen or ancillary accommodation
- 5 Well
- 6 Tree
- 7 Mud wall - boundary
- 8 Secondary entry

[above left and middle]  
Examples of Arish use in  
Al Murabba and Al Sultan  
Forts in Al Ain

[above right] Arish use in  
mud buildings – typical roof  
detail in Al Qattara Fort,  
Al Ain, August 2009

Buraimi Oasis, 'zigzag' fence, unique  
to the area, 1948 (measurements are  
given in centimetres)



**Palm-leaf use in mud buildings**

Al Ain is famous for its series of forts, towers and mud brick houses. Some of them are magnificently located in oases surrounded by palm trees. Some were reconstructed in the 1970s and 1980s, while others were left in their poetic settings, with emergency conservation works carried out by the Abu Dhabi Authority for Culture and Heritage (ADACH). The use of palm tree fronds in these buildings is typical, including, for example, Arish mats, locally called daan, for the roofs and ceilings.

**A typical house – Khalfan M. Al Dhaheri's Arish**

According to Khalfan M. Al Dhaheri, Sheikh Zayed created new housing for the Al Ain families at the end of the 1960s, prompting a relocation of the population from the Arish to the new houses.

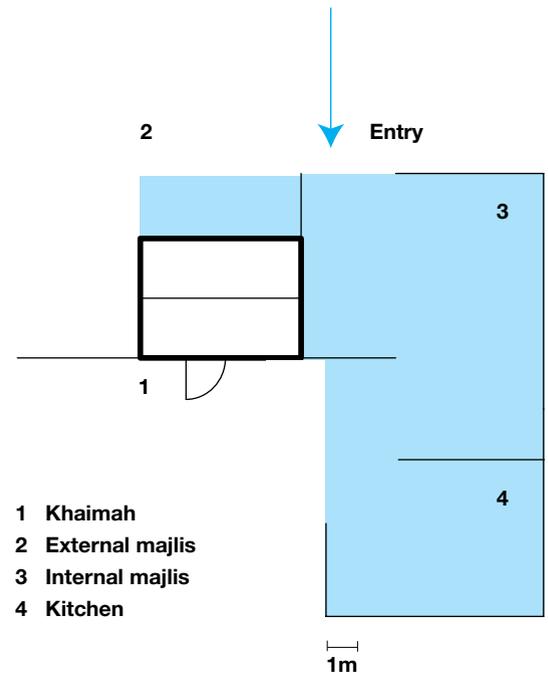
Mr Al Neyadi, a Director of Al Ain Museum, points out that Arish houses in Al Ain customarily had a door positioned in opposition to the prevailing eastern Shamal winds. Nevertheless, they were unable to withstand a fierce storm that swept through in 1968 and were destroyed. This destruction makes it hard to establish exactly what a traditional Arish house in Al Ain looked like, because there are very few historical accounts remaining and such documentation as exists describes houses built in the 1970s, which were influenced by the structures of the khaimahs in Abu Dhabi (see drawing above).

It was a great privilege to be able to visit Mr Al Dhaheri's farm in Al Ain and see the Arish houses he had constructed, which represent a traditional Al Ain style of Arish. Generally, people lived in tent khaimas or winter khaimas during the cold season. Palm-leaf houses of a lighter construction, also called

khaimas because of their pitched roofs, were used during the summer. Sophisticated palm-frond connections emphasized the richness of the material, which was also expressed through the variety of external surfaces with and without leaves.

### Palm-leaf and 'recreation' buildings

An interesting modern application of palm leaf in Al Ain may be seen in recreational buildings such as restaurants and shisha bars, drawing attention to a cultural dynamism and a happy blending of old and new. The Al Qattara Oasis Heritage Village restaurant pictured opposite is a perfect example of cultural diversity. Arish decorating a fountain or Christmas lights may not be part of Emirates tradition, but it succeeds and somehow fits well within the context of forts and mud buildings and the ways in which people imagine the UAE heritage. What is astonishing about the restaurant shown opposite is the quality and scale of space achieved.



[left] Khalfan Mohammed Al Dhaheri in his Arish house in Al Ain farm

[right] Arish use in recreational buildings, Al Jimi Oasis Shisha restaurant

[opposite] Al Qattara Oasis Heritage Village restaurant, Al Ain, August 2009





# Abu Dhabi City

One of the most influential writers on urban planning of the 20th century, Jane Jacobs, in her book *The Death and Life of Great American Cities* offered a critique of modernist planning policies that destroyed inner-city communities and neighbourhoods. Medieval European cities did not have street patterns like those of New York; they grew organically in form and function, with a dynamic mix of residential and commercial functions and, above all, external public space.

Abu Dhabi city during 'Arish times' could be compared to a medieval European city in the dynamism of its organic growth. These cities, inhabited mainly by Bani Yas tribesmen, evolved along the route from the port at the coast to Qasr Al Hosn fort, the oldest stone building in the city of Abu Dhabi. The tribal rules for households and families remained as in the villages, so that belonging to a section of a tribe was paramount in their society and determined where people built their houses. We can see from the aerial photographs of Abu Dhabi settlements that, as in Liwa also, one cluster consisted of six or seven households.

These Arish settlements are the perfect example of the organic growth of a city without a masterplan. Abu Dhabi still looked like a typical Bedu city until 1965–68, when the Bedu tribes began to relocate to social housing, leaving behind their Arish houses, which were rented out to Indian and Pakistani expatriates.

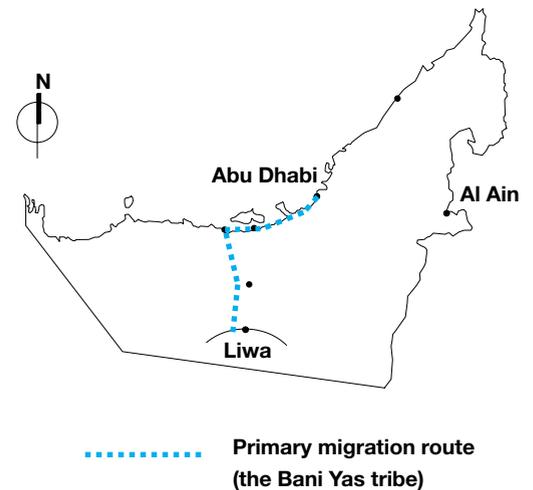
For reasons still not clear today, the Arish quarters caught fire. The Bani Yas tribeswomen used to cook over an open fire in the Arish kitchens in Liwa, but none recalled a fire breaking out, as they would have been very careful. Fire was not the reason for the disappearance of the houses in Liwa. According to local reports, they were dismantled when the asphalt road was built. Similarly in Al Ain, fire was not the cause of the departure of the Bedu from the Arish houses. Mr Khalfan M. Al Dhaheri said in an interview that the relocation to 'proper' houses happened on the orders of Shaikh Zayed after the big storm in 1968, which demolished some of the Arish houses.

## The streetscape

Photographs of Abu Dhabi souk illustrate how adaptable the Arish materials were, being used not only for residences but also for souks and markets, the mainstay of city life.

Today the palm-leaf settlements have simply disappeared and Abu Dhabi is a modern city, yet there is always the hope that the Arish craft can be reintroduced to the city and given contemporary applications.

Route of original tribal migration into Abu Dhabi



Abu Dhabi in 1960

[opposite] Street scene from Abu Dhabi market, March 1960



**Typology of a house**

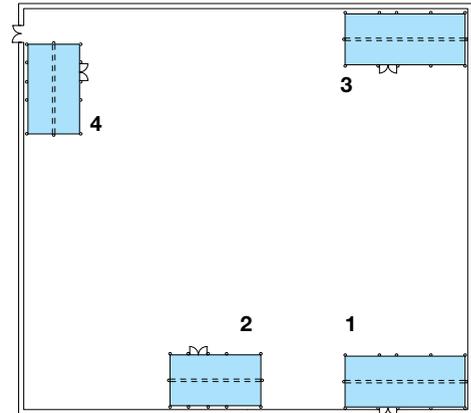
Abu Dhabi during Arish times was unusual insofar as it contained within the city spacious households with large courtyards that maintained privacy. The courtyard remains a predominant building form. Within a typical household enclosure there was a family room, a majlis building, to which access could be gained from the outside only, and a kitchen next to it.

The pitch-roofed palm-leaf houses called khaimas were large. Chandel timber frames (or any timber frame available) were used for the primary structure, palm-leaf daan mats for the secondary structure. Roofs were covered with linen and mats or plastic sheets for waterproofing.

**Summary**

We do not know a great deal about the nature and use of palm-leaf settlements because they simply disappeared and today Abu Dhabi is a modern city. There is scope, however, to reintroduce Arish heritage to the cities of Liwa, Al Ain and Abu Dhabi, in spite of their unstoppable economic and social development. The question is how to reintroduce palm-leaf building within the existing built environment, not in a token and superficial way but in an authentic way that links the past with the future.

Part of the answer may lie in legislation and the compulsory cultural contribution that any new building must demonstrate. Architectural debate, at the level conducted in the UK or Europe, needs to happen at a national level in the UAE to enable the cultural dynamism described in this book to be harnessed. Let us not only preserve the heritage but also interpret it within 21st-century thinking, drawing inspiration for buildings and urban spaces from the ingenious solutions devised by the Bani Yas tribesmen.



Typical Arish house courtyard in Abu Dhabi, 1960

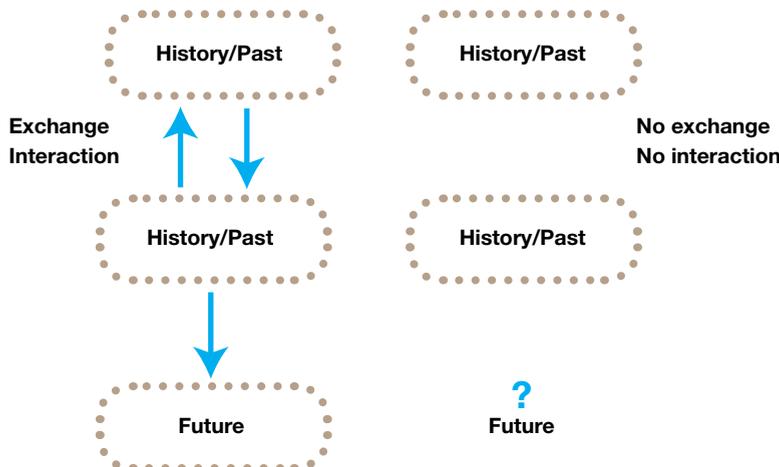
- 1 Majlis for guests (with external entry)
- 2 Kitchen
- 3 Family house
- 4 Store



[left] Interaction with the past is seen as a solution for the future cultural continuity

Typical palm-leaf houses in Abu Dhabi, called khaimahs, characteristic type of construction in all coastal areas in the north of the UAE

[opposite] Abu Dhabi market in November 1962





## Sir Bani Yas Island

Accounts of Sir Bani Yas, a natural island just off the coast of Abu Dhabi, are few. The earliest reference to the island dates from 1590, when Gasparo Balbi, jeweller to the Republic of Venice, recorded 'Sirbeniast' as one of the places where pearls were fished.<sup>4</sup>

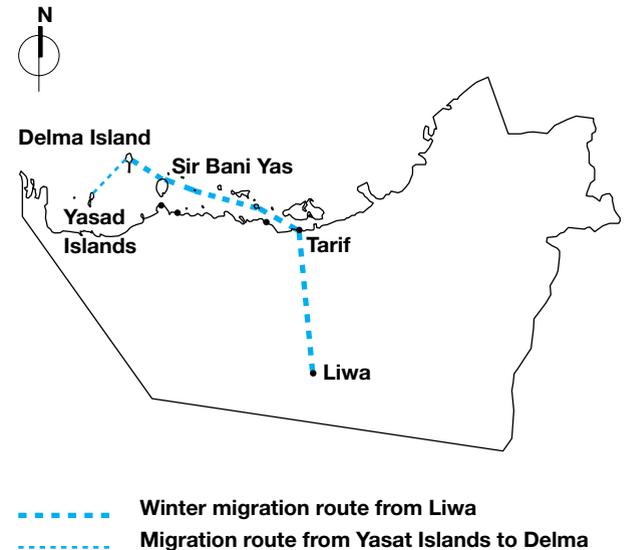
The reference to Sirbeniast tells us that Bani Yas tribesmen from Liwa were well established on the island by then. From more recent reports, we know that during the winter months, after they had collected the dates and cleaned<sup>5</sup> the palms, the Bani Yas tribesmen would migrate from Liwa to present-day Tarif, a journey of twenty days by camel, and from Tarif to Sir Bani Yas (SBY) island and Delma, with some stopovers on the neighbouring small islands. Lack of drinking water on SBY resulted in an exodus of the population to Delma in the 1970s. Both islands were in the centre of the pearl banks, which, together with their location on the trading routes in the Gulf basin, known to sailors from ancient times, made them attractive ports.

In his book *Abu Dhabi Islands Archaeological Survey*, G.R.D. King describes how a survey in 1992 made archaeological discoveries in the east of the island dating from the 6th and 7th centuries AD. The finds included remains of courtyard houses, a mosque and a cemetery from the Late Islamic period. Settlement sites found in the north of the island, in the area called Al Zahir, show evidence of Pre-Islamic and Late Islamic human presence. An early Christian monastery has also been recorded on the island.

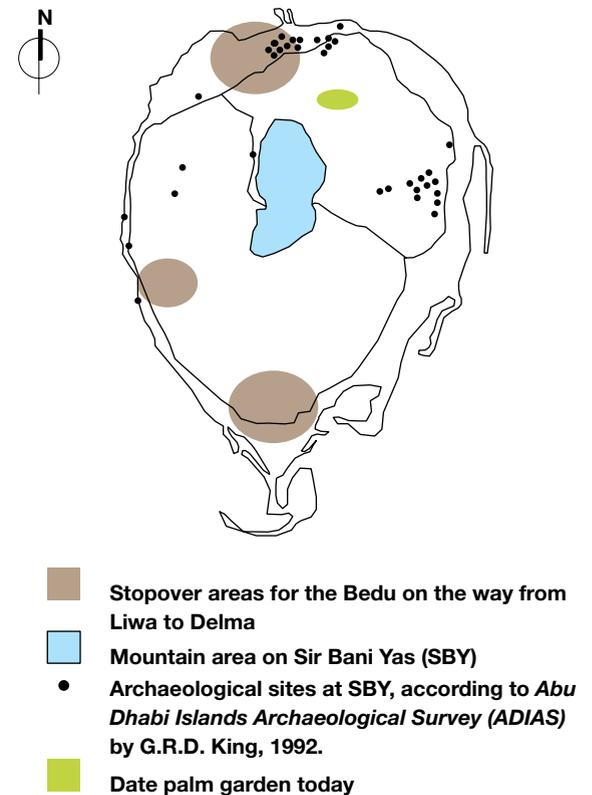
The Bedu left the island almost thirty years ago, leaving it devoid of inhabitants. One relatively small date palm garden offers the only natural supply of palm leaves, whose fronds are used in the roofing for animal shelters at the island's Arabian Wildlife Park, which accommodates five thousand animals. These shelters are constructed from precast columns and steel or timber roofing frames, on which are placed loosely woven daan mats. No particular Arish style is detectable here, but rather practical use of the palm leaves to give shade.

[opposite] Sir Bani Yas island, palm-leaf use for animal shelters in the Arabian Wildlife Park

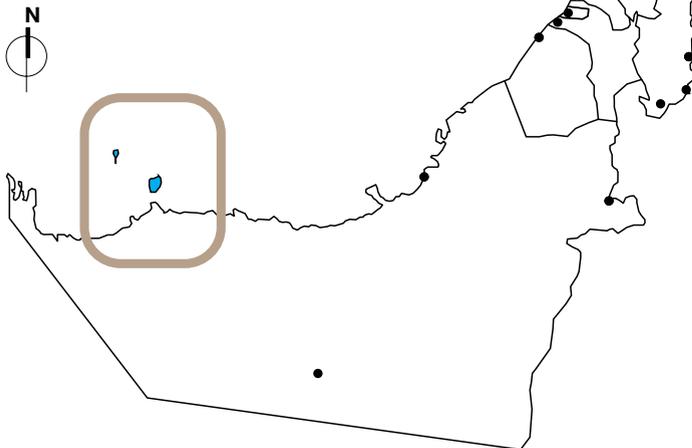
Winter migrations from Liwa



Sir Bani Yas Island, archaeological sites and locations of the stopover areas on the winter migrations routes between Liwa and Delma.<sup>6</sup>



Sir Bani Yas and Delma islands





# Delma Island

[opposite] Sunrise on Delma

The most meaningful discovery on Delma, at the site D11, is that of date palm stones and evidence of the use of date palm trunks for a building estimated to be seven thousand years old. These form the earliest evidence of date palm use history in the Emirates and south-east Arabia. It is fascinating to know that the island has been inhabited for so long, probably as a result of its geographical location and the presence of drinking water. Delma was even more famous for pearl trading (the 'Lulu trade') than Sir Bani Yas island. Lorimer<sup>7</sup> describes the locations of the pearl banks in 1908 and places Delma in the centre of pearl trading.

People would settle in Delma from present-day Qatar (including the Yasat islands), Iran and India. There is considerable evidence of the presence of sections of the Bani Yas tribe – namely the Al Mazrouei and Qubaisat who came directly to Delma from Liwa and have lived on the island until now.

A Venetian jeweller, Gasparo Balbi, recorded a visit to 'Delmephialmas' in 1590 and 19th-century navigators' diaries offer accounts of the island in the 1820s, 1829 and 1891.

The islands' survey carried out in 1992 by G.R.D. King found three mosques from the Late Islamic period, a village settlement and a Muraykhi house, which has recently been renovated by the Abu Dhabi Authority for Culture and Heritage and converted into an impressive museum. In addition, the *ADIAS* (*Abu Dhabi Islands Archaeological Surveys*) findings report the presence of cemeteries, village occupations and wells from the Late Islamic period.



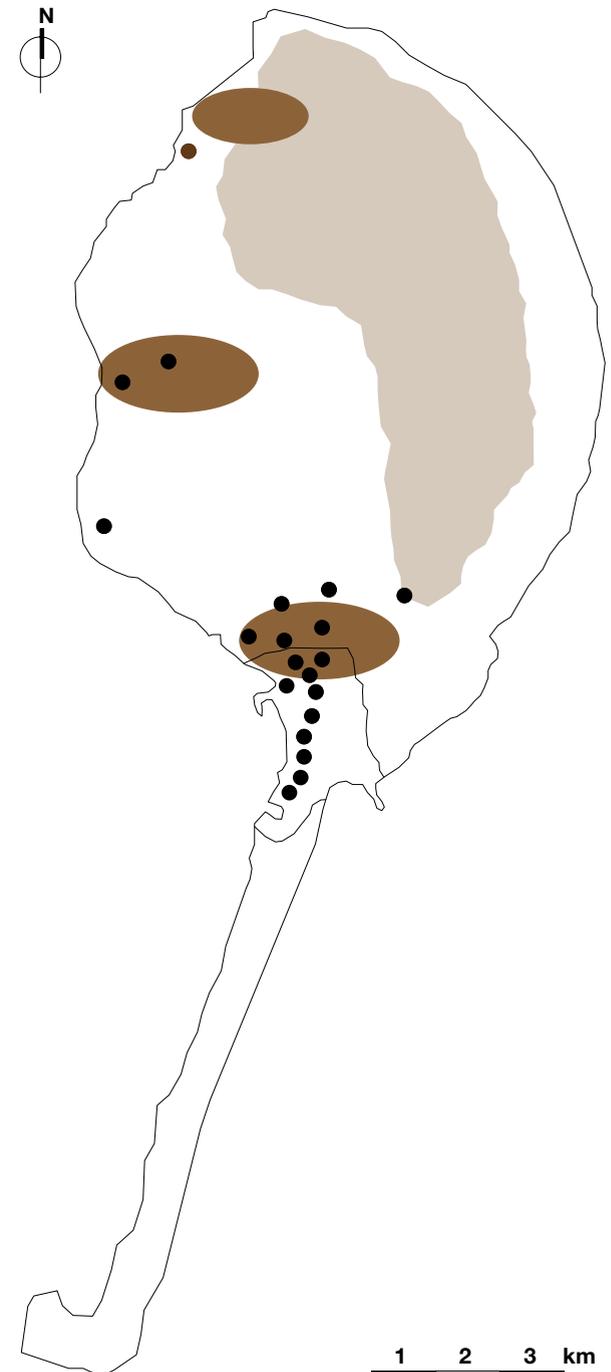
7,000-year-old house excavated at site 11 on Delma island by Dr Mark Beech and Elizabeth Shepherd. It provides some of the earliest evidence for houses in Abu Dhabi, the UAE and south-east Arabia.



The houses were circular in shape and had wooden posts arranged roughly a metre apart, judging from the positioning of the surviving post-holes cut into the natural sediments.

Fragments of broken body sherds from plaster vessels were found stuffed into four of the post-holes, which had been used for post packing. It is assumed that Arish was then wrapped around the outside of these holes.

Archaeological sites on Delma island



- Approximate location of the pearl ports in 1908, according to Lorimer
- Archaeological sites, according to *ADIAS* by G.R.D. King, 1992



## Delma Island – khaimahs

Research on the old town typologies in the UAE showed that the houses of the 1970s were predominantly constructed on the location of earlier Arish settlements. Current houses constructed at the south-east of the island are based on the typology of previous Arish houses too.

A typical pitched-roof house and its different household functions are variously influenced by settlements in the coastal areas of the Gulf and Liwa. One such khaimah would accommodate a single family unit. Entry to the house would not be from the flat-topped wall but rather from the gable side, like Arish houses in the Liwa region. A separate small enclosure was constructed outside the khaimah, again resembling those in the Liwa settlements. In all the other coastal areas of the Emirates, washrooms were always located inside the khaimahs. It is possible that the presence of Bedu families from Liwa could have had some influence on the spatial organization of a typical Delma household. Khaimahs were used as winter houses and in the summer a family would construct an Arish on the beach in which to sleep and catch the sea breezes. These Arish beach houses would have been simple rectangular shelters with wide spacing between the fronds to allow the wind to pass through. Loose palm fronds would have been transported to Delma from Al Ain via Abu Dhabi or Liwa and later on from Madiant Zayed.

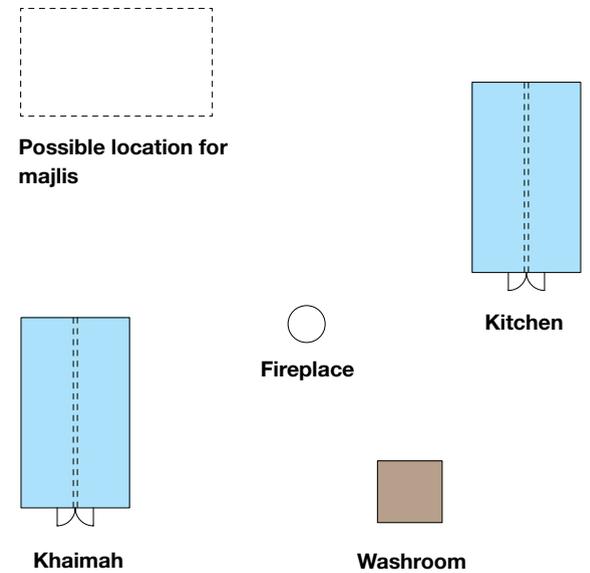
Today, there are only two khaimahs remaining on the island, situated at the summer house settlement of the Al Qubisi family in the north.

## Palm leaf and the local economy

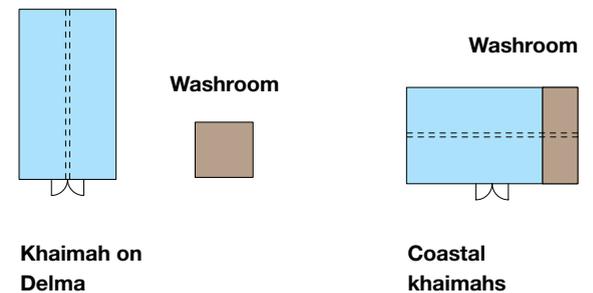
Arish buildings served many functions throughout the Emirates, in the domestic sphere, in agriculture and in local industries.

With economic development and the availability of other building materials, palm fronds now have limited uses in construction. However they are used in such things as animal shelters, and shelters for the gargour (fishing net) makers. Although they are usually utilized in relatively humble and ordinary spaces, the interiors often enjoy an extraordinary ambience. Two date stores at the Motel Farm next to Delma Hotel (pictured opposite), originally built by Delma Municipality as two wedding halls, one for women and one for men, perfectly demonstrate how astonishingly beautiful internal spaces can be created by simple means.

A typical khaimah settlement on Delma.<sup>8</sup>



Differences in locations for doors and washrooms



[opposite] Al Qubisi family khaimah summer house; Fathi Mohammed Abdullah of ADACH with a housekeeper

[opposite far right] A spectacular example of Arish interiors: former wedding houses at Motel Farm transformed into date stores







### **Memories of Liwa**

Salama Saeed Al Mazrouei was born on the way from Liwa to Delma. Her memories of Liwa are so strong that together with her mother, Ateega Al Mazrouei, she decided to transport sand from Liwa to their house on Delma. Every evening during their stay on Delma, they sit outside the house in an external majlis area covered with sand from Liwa. People usually come for a chat and enjoy their hospitality. It was Ahmed Ghanim Al Mazrouei from Tamm who introduced me to these ladies and I was privileged to listen to the stories of their journeys. Their memories are vivid and they miss the simplicity of life in the past. The hardships of their journeys did not stop them from following the ritual of seasonal migrations for sixty years. In the summer they travel via Abu Dhabi to Liwa and in the autumn they come back to winter in Delma. In the old days this journey would take up to one month: two weeks across the desert by camel and a further possible two weeks, depending on the winds, to travel from Tarif to Delma. Ahmed reported that it could take his father up to three days to travel from Sir Bani Yas island to Delma if the winds were unfavourable.

The scale of the island, its low-level urban fabric, landscape and proximity to the sea enable its residents and visitors to perceive day and night through the prism of sunset, moonlight and sunrise, and to connect to the rhythm of the day by quite different means from those experienced in the big cities.

**Mrs Salama Saeed Al  
Mazrouei making a rope  
from palm-tree fibres**

# Fujairah and the Emirates of the north-east

The north-eastern Emirates of the Musandam Peninsula are strategically situated on the ancient trading routes between Mesopotamia, India and China, which passed through the Arabian Gulf and the Gulf of Oman. Fujairah, Hatta, the city of Kalba, Ras Al Khaimah, Umm Al Quwain and Ajman boast a rich history of connections with the civilizations of Mesopotamia, Ancient Greece and Rome. In the earliest times, people settled where fresh water was available and the land was suitable for agriculture and food production. Their response to the climate was to construct different building types according to the seasons, making temporary buildings for the summer migrations. Throughout the centuries, people in this region have cultivated dates for food and used elements of the palm tree to create buildings and everyday objects.

Hajar mountains



Although the palm tree has been used generally as a building material throughout the Emirates, not every building made from palm leaves was called Arish. In principle, summer houses are called Arish, whereas the winter houses are known as khaimahs. Even so, Arish houses vary slightly from one Emirate to another. The summer Arish Cayady of Ras Al Khaimah, for example, differs from the summer Arish house in Hatta, which was a rectangular structure with one completely open side. The spelling of the word Arish also varies – in the northern Emirates it is spelt Areesh. The etymology of the word is uncertain, but the story is that it derives from the Arabic ‘al-reesha’, meaning ‘a feather’, as palm leaves look like feathers, particularly when joined together.<sup>9</sup>

The story of palm-leaf buildings is a tale told by ordinary people. In the absence of books in English on anthropological and ethnographic research covering the entire UAE, I relied mainly on interviews, many with people I met by chance during my journeys. The best-documented were Ras Al Khaimah Emirate and Hatta, and the works of Walter Dostal, Beatrice De Cardi, Christian Velde and Imke Moellering in Ras Al Khaimah, and Rashad Bukhash in Hatta, have proven invaluable.

The Arish heritage remains alive as long as people who know how to put the palm-leaf fronds together to make a building in a subtle and beautiful way are still living, but there is not much time left to record their knowledge, as the Arish masters are now mostly between 70 and 82 years old. I sincerely hope that the present work is only the first of the initiatives to take place in the UAE, fostering an Arish revolution at national level.

### Landscape and geography

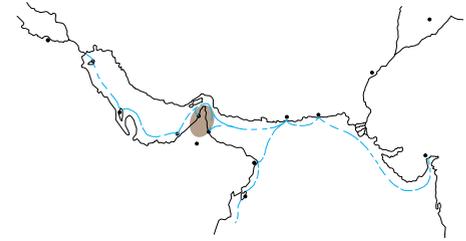
The south-eastern part of the Arabian Peninsula is surrounded by mountains that extend from Yemen and Oman up to the northern part of the Musandam Peninsula. These mountains are a source not only of fresh water but also of a building material: stone. The landscape of the north-eastern Emirates is richly diverse. The eastern side of the Al Hajar mountains meets the Gulf of Oman and the western side encounters the desert. The northern part of the peninsula borders the Strait of Hormuz, bounded on the other side by Iran, forming the strategic entrance to the Arabian Gulf from the Indian Ocean. This land was a natural stopover for mariners on the ancient sea routes (see maps, right).

### Ancient trading routes

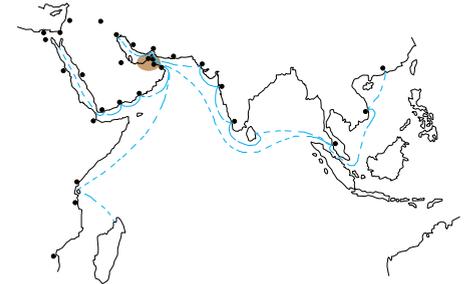
Archaeological surveys, both in the Fujairah region and in the coastal areas of Julfar (present-day Ras Al Khaimah) show that there was an exchange of goods with Mesopotamia in the third millennium BC. Later generations of traders would adapt the original trading routes and initiate wars in order to obtain ownership of the strongholds. The arrival of the Portuguese in present-day Ras Al Khaimah in the late 15th century placed the UAE on routes trading with countries as far away as China. Their situation on these ancient sea routes had a great impact on early human settlement in these northern and eastern areas.

Sea routes as known to sailors  
in the Gulf and the Indian Ocean

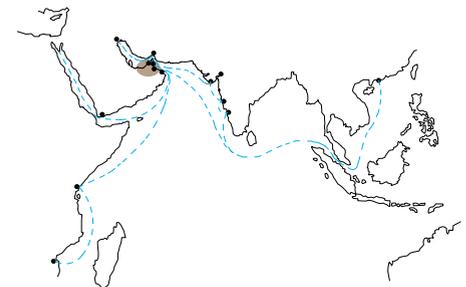
3rd and 2nd millennium BC



8th to 13th century AD



15th century AD Portuguese routes



■ UAE



[top] Hajar mountains

[above] Khaimah by Hassan  
Ali Hassan Al Ali, Falaj Al  
Mualla, October 2009

### **Archaeology**

Throughout the Musandam Peninsula there is archaeological evidence of a lively inhabited area dating back to the third millennium BC. Mesopotamian texts written by Babylonians, Sumerians and Akkadians mention that copper was imported from Megan via Dilmun. Dilmun has been identified as present-day Bahrain and eastern Arabia and most archaeologists agree that Megan includes the southern and eastern parts of the Musandam Peninsula, i.e. present-day UAE and Oman. Megan exported copper and diorite stone to Mesopotamia and imported food and textiles from the Babylonians.

Pottery and graves discovered at archaeological sites in Fujairah Emirate such as Bidya are similar to those found in Shimal (now Ras Al Khaimah), Qattarah in Al Ain and Umm Al Quwain. What does history tell us of the palm tree? Dates are known to have been consumed on the peninsula as far back as the third millennium BC. Fifteenth-century iconography confirms that in the coastal areas palm leaves were used for architecture, the predominant form being the khaimah, and that in the centre of the peninsula people used palm fronds for the construction of palm-leaf summer houses. The summer migration by families to the inland oases, traditional all over the north-eastern Emirates, continued until around the 1980s, when the practice ceased, partly because the water supply in the valleys dwindled as a result of climate change and partly owing to economic development, which permitted people to travel further afield, even abroad, to escape the extreme heat and humidity of the coast.

# Hatta

Hatta is situated in the Wadi Hatta valley in the Al Hajar mountains and is well watered by falajes, wadis, springs and pools, as well as seasonal rain. Its site in the valley and access to water provided ideal conditions for human habitation and the cultivation of date palms, crops, fruits and vegetables in the summer season. Its unique microclimate offered possibilities for the growth of date varieties that are seldom found elsewhere in the United Arab Emirates, such as Al Neggal, Mohash and Al Anwan, as well as tobacco, until twenty years ago. There is a restored Arish tobacco store in Hatta village today.

Evidence of the first settlements in Hatta dates back three thousand years. Its fertile land and fresh water made it an ideal stop on the trading routes in the Al Hajar mountains. Hatta exported tobacco, dates, honey, cooking butter and sheep, in exchange for such goods as flour, rice, coffee and sugar.

The people of Hatta pay allegiance to the Al Maktoum family and Hatta is still governed by Dubai.

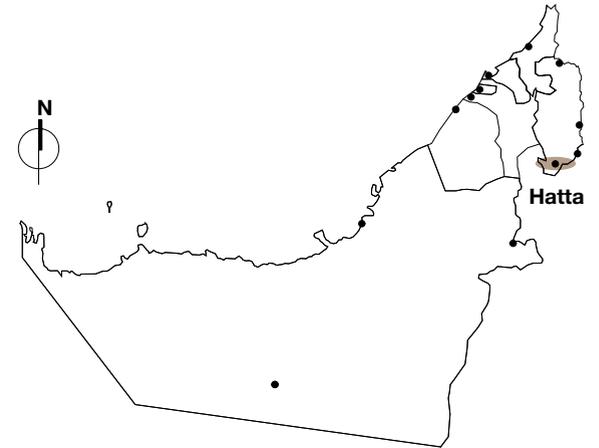
## Hatta Old Village.

Hatta Old Village is a perfect model of a two-hundred-year-old small town. It is a homogeneous settlement with all the attributes of a fort, together with a majlis, houses, stores, two towers, oasis gardens and a water falaj near by, a mosque and a cemetery. Sheikh Rashid Al Maktoum was a frequent and welcome visitor to Hatta and local people still talk of him fondly as a ruler who looked after his subjects, giving them land and machinery – all that was required for a sustainable way of life. Sheikh Rashid chose their tribal leaders from the Bin Hamd and Bin Gharib families. Tribes currently living in Hatta are the Al Hashemi, Al Bedwawy, Al Magbali, Al Kaldi and Al Matawei.

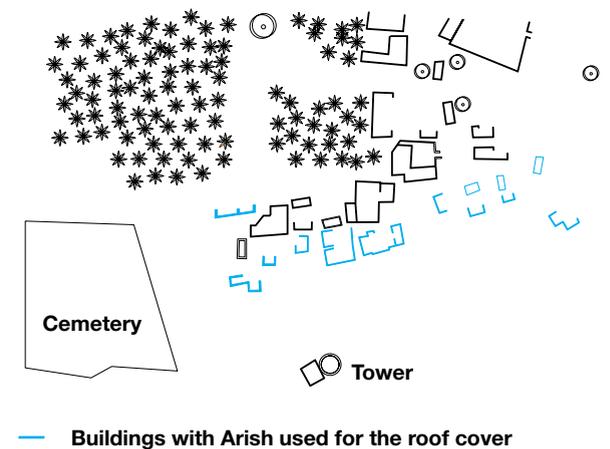
The restoration of Hatta village was carried out by the Dubai Municipality under the leadership of Rashad Mohammed Bukhash, Director of Strategic Planning and Heritage. This admirable work was carried out in two phases. Phase 1 commenced in 1993–95 and Phase 2 was completed in 2001.

## Hatta house typologies

Throughout the Emirates, house types have their own regional names, even those that are built only from palm leaves. The following palm-leaf house typologies are specific to the Hatta region.



Hatta Old Village site plan in 1990 (before Dubai Municipality second restoration)



Heritage village, Hatta, October 2009



### **Areesh (Arish)**

This was a summer house that would allow ‘the weather to come in’. It was constructed from palm tree fronds mainly without leaves and with wide spacing between the fronds at ground level (up to 10 cm) to allow the wind to penetrate. The roof could be slightly pitched or flat. Characteristically the entire front of the rectangular enclosure would be open. Areesh buildings had no doors. Similar houses would be built up in the mountain oases for a single family to live in during their summer migrations to collect dates. This Areesh (Arish) typology is still used in the Fujairah mountains as a summer house for families who continue the tradition of summer migration.



### **Barasti**

English speakers often refer to any Arish building as a ‘Barasti hut’. What the people of Hatta call barasti, however, is a rectangular building with a flat roof and a doorway in the middle of the front wall, constructed from an Arish frond, peeled of its leaves and put together in a pattern called sarabic, based on 10 cm by 10 cm spacing. Barasti buildings would always have hassir mats behind the Arish wall, where the air could not enter, and were sometimes used as majlis in the winter months of November to March. In some barasti interiors there was a small area designated as a bathroom (similar to khaimahs in the coastal and northern Emirates).



### **Khaimah**

In all seven Emirates, the khaimah is a building with a pitched roof, used as a winter house and built totally from palm leaves woven tightly together in order not to allow cold wind or moisture to come through. In traditional khaimahs, including those of Hatta, the roof frame would always be constructed from a net of Arish fronds resting on a palm tree or chandel timber beam. The roof was covered with hassir mats and occasionally bitumen before the final layer of daan mats was applied. The interior of a khaimah would have sand, gravel or hassir mats on the floor. Internal walls might be covered with hassir mats, depending on the availability of materials and the status of the family.



### **Kada**

Mountain regions offer a diverse source of building materials, stone in particular. The walls in kada buildings were built from stone, covered by palm leaves. They were used for storage or as family houses. Apart from Hatta, kada houses are found in the Al Hayl Palace areas of Fujairah Emirate.

Hatta heritage village,  
various styles of palm-leaf  
houses from the region,  
called (from top to bottom)  
Areesh, barasti, khaimah  
and kada, October 2009

**kuse**

Palm frond (called zoorl) with leaves intact

**sarabic**

Style of connecting palm-leaf fronds, usually into approximately 10 cm x 10 cm squares

**hassir**

Mat woven from palm leaves

**habel**

Linking rope. The combination of the palm fronds connected in the sarabic way with hassir mats behind is called barasti in Hatta

**Palm leaf weave typologies in Hatta**

Local names for some of the palm-leaf patterns.

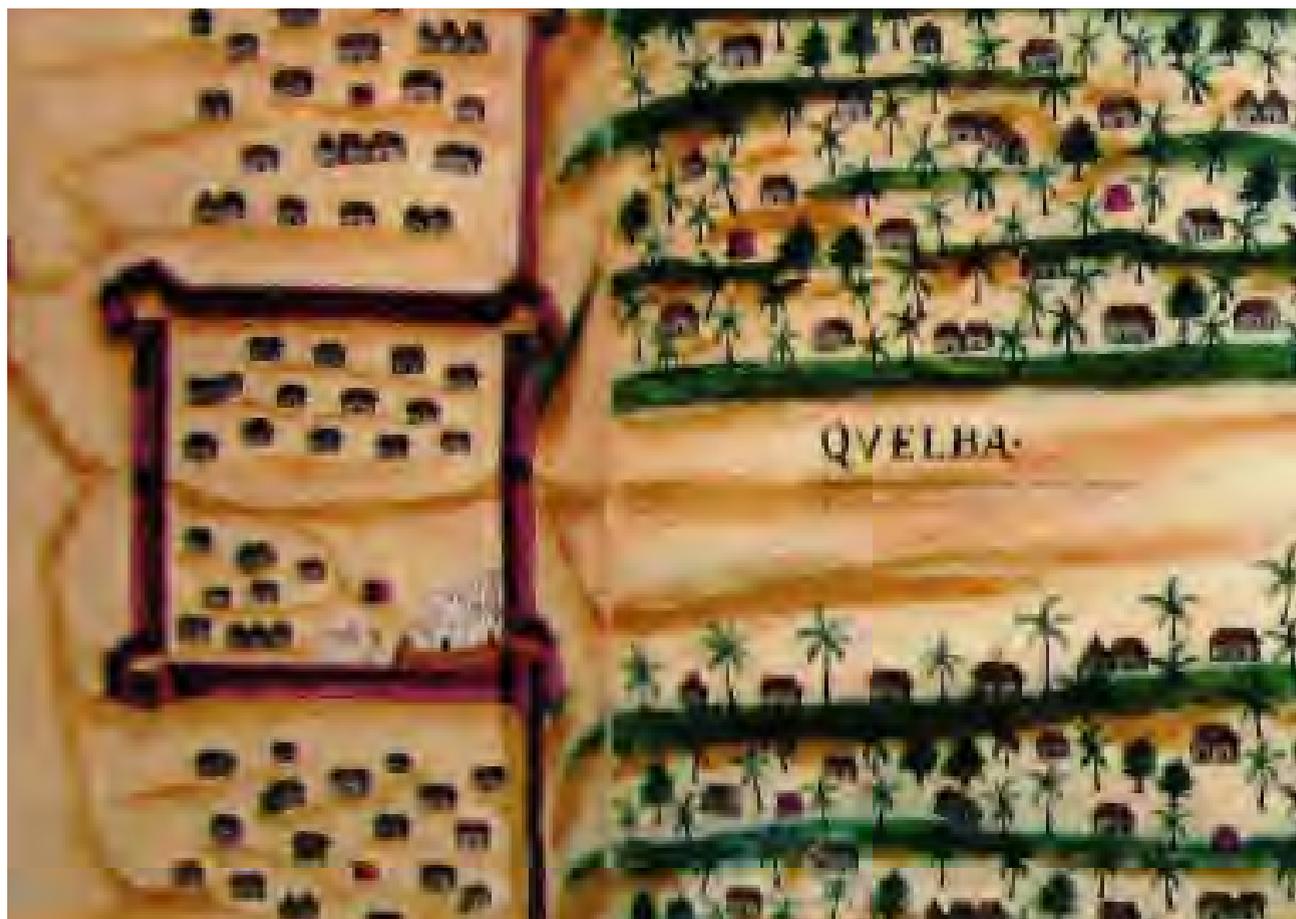
As we have seen, palm-leaf architecture in the UAE can be divided into summer houses and winter houses. Whereas the winter houses had walls made from tightly woven palm-leaf fronds with the leaves intact, the summer houses typically had walls and roofs with a porous layer to allow the wind to penetrate through to the interior. The use of more loosely woven, less dense layers and connections, combined with sunlight, created a magnificent ambience and quality of space in the interior.

### **The Portuguese and khaimahs – eastern and northern Emirates**

In 1498 the Portuguese explorer Vasco de Gama arrived on the shores of Julfar (present-day Ras Al Khaimah) in search of a navigator who would guide him to the western Indian Ocean, and had the good fortune of finding and engaging the famous Arabian navigator Ahmed Ibn Majid.

Iconography dating from 1635 (pictured below) shows Portuguese strongholds from the 15th to 17th centuries. The Portuguese seized all the major ports and with the submission in 1515 of Hormuz and later of Bahrain, obtained control over shipping in the Gulf until the early 18th century. The Portuguese-built forts have not survived, but 17th-century iconography shows their architectural form and location within date palm oases, surrounded by Arish khaimah houses. This type of Arish house, including the similar location of doors, survived in the Emirates for the next three hundred years. Photographs of UAE towns from 1935 show khaimah settlements in all coastal cities.

Kalba, c. 1635. Original image from *Arquivo Portugues Oriental*



# Fujairah

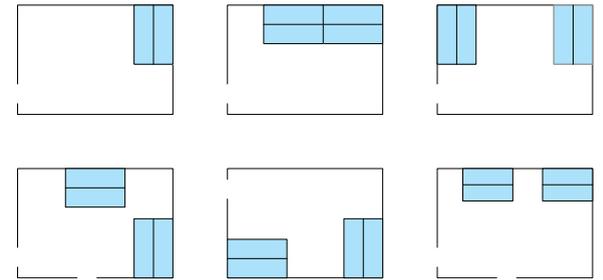
The Emirate of Fujairah has a unique geographical location on the Gulf of Oman and attracts many modern tourists thanks to the juxtaposition of mountains and sea, together with many beautiful valleys planted with date palms.

## Fujairah Fort

Fujairah Fort was built between 1500 and 1550 as a residence for the Fujairah rulers, descendants of the Sharqiyin tribe who trace their origin to Yemen. The fort was destroyed by the British in 1925 during the struggle for independence in Fujairah, which was finally recognized by the United Kingdom as a Trucial Coast state in 1952.

Constructed with rocks and lime-based plaster, the fort is surrounded by a small village of houses that resemble khaimahs, called kareem, each of which housed one family. They are characterized by mud-brick walls, with a roof covering made from palm leaves. Originally the frame for the roof of kareem houses was made from Arish fronds (as in traditional khaimahs) and covered with daan mats. The entire village would participate in making daan mats. The same house typology would be used for food storage also, differing in that the entire building was recessed approximately one metre into the ground. This type of food storage was called hamia.

Location of kareem houses within one household fence



Kareem houses at Fujairah Fort, September 2009







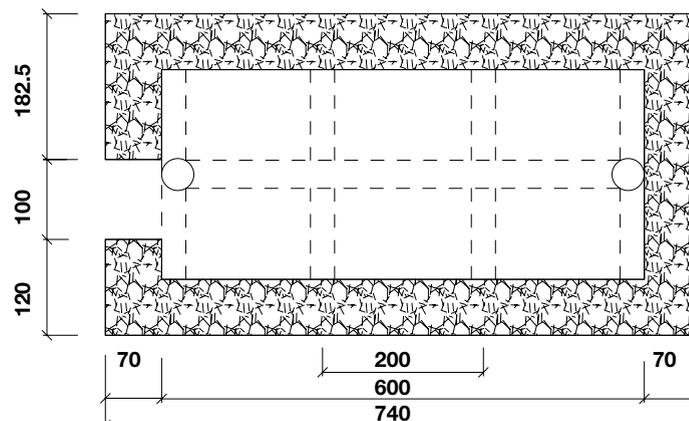
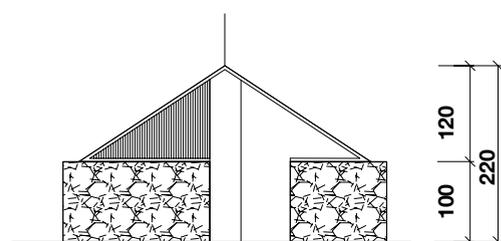
### Al Hayl Palace, Wadi Al Hayl

Situated in one of the most beautiful landscapes in the UAE, Al Hayl Palace is a real 19th-century jewel and one of the country's most captivating historical sites. It sits in the valley of Wadi Al Hayl in the Al Hajar mountains, surrounded by a date palm oasis. Built in 1830 as a residence for the Al Sharqiyin family, the ruling family of Fujairah Emirate, this remarkable complex consists of a palace, majlis, mosque and prayer platform, a tower and a series of kada houses constructed from stone and covered with a tent-like palm-leaf roof.

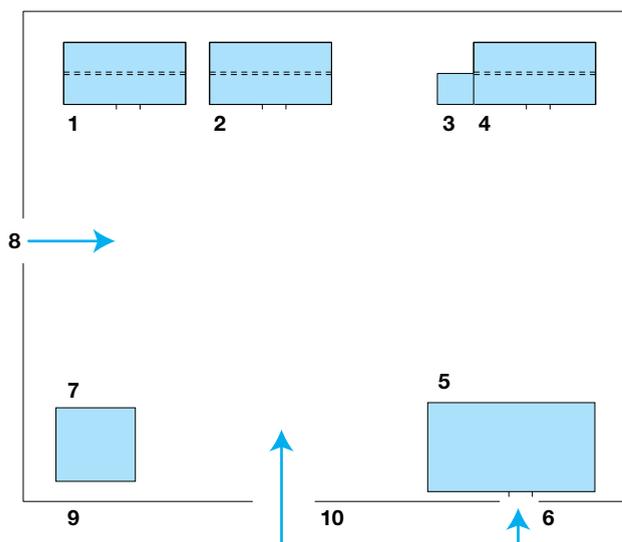
Restoration works have been carried out in recent years by Fujairah Department of Antiquities and Heritage.

[above] Al Hayl Palace, at one of the most beautiful sites in the UAE, Wadi Al Hayl

[opposite] Al Bithnah Fort



Plan and elevation of kada houses from Al Hayl Palace (measurements are given in centimetres)



Al Yamahi household – a typical family house in Bithnah Fort

- 1 Area for mother, father and small children (pitched roof)
- 2 Elder children (pitched roof)

- 3 Bathroom (washroom)
- 4 Kitchen (pitched roof)
- 5 Majlis for men (flat-roofed areesh)
- 6 External access to majlis
- 7 Shelter for animals
- 8 Access (door)
- 9 Arish fence
- 10 Main family entry

### Bithnah Fort

Bithnah Fort at Wadi Ham is situated next to a dried-up river bed and surrounded by a three-hundred-year-old village. The people of Bithnah village were settled tribes, who did not participate in the seasonal migrations to the coast because food was available on their doorstep. Bithnah tribesman would occasionally travel to Dubai to sell dates in exchange for fabric and spices. There was a river and access to fish, dates from the date palm gardens nearby and at, least until the 1980s, there was sufficient rainfall to permit the watering of successful crops of vegetables and fruit, such as watermelon, papaya and citrus. Some residents of Fujairah Castle would come over to Bithnah during the summer. Tribal families living in Bithnah are the Al Mazrouei (originated from Ras Al Khaimah), Al Kindi (Yemen), Al Kaabi (Iran), Al Seraidi (Oman), Al Braiki (Oman), Al Hamoudi (Iran), Al Zehmi (Emirates) and Al Heafaiti (Jebel Hefeet in Al Ain), and their tribal leader comes from the Al Zehmi family.

Arish kareem houses were the typical architecture of the village until new houses were built in the 1970s on the exact location of the old ones. A similar pattern of creating settlements was repeated across the UAE, and quite often these unassuming single-storey buildings from the 1970s offer an understanding of the spatial organization of the original Arish settlements.

Farming of dates, crops and goats was the traditional employment in the area before the economic revolution. Men typically rose at 6am, ate breakfast before starting work and came back from the fields at around 12 noon.<sup>10</sup>



Examples of palm-leaf coastal architecture in Dibba and Kalba, on the Gulf of Oman, September 2009

### **Arish typology unique to the region**

Arish was used as a material for a variety of building types, including houses, kitchens, animal shelters, storage, majlis, fishermen's enclosures and schools. In most of the villages in the Emirates before unification, education took place in the house or Arish school of a teacher called a Mutawa. The Mutawa would teach the Holy Koran, Arabic and basic mathematics. Parents would pay for the lessons not with cash but by bringing food such as eggs and fruit to the Mutawa. There were separate classes for boys and girls. In some villages the Mutawa would also assist a community as a doctor.

The method of Arish connections used in the school was unusual for the eastern and northern Emirates – in Abu Dhabi Emirate, for example, it has not been recorded at all. The entire palm leaf was used to construct the wall, including part of the frond without leaves and part of the frond with leaves. This method allowed the air to penetrate to the interior at ground level, acting as a natural ventilation device. However, this general Arish typology is still in use today in the Ras Al Khaimah region. In Fujairah Emirate, its presence has only been noted at the Fujairah heritage village (see page 147).

### **Palm leaf in everyday use**

In Fujairah Emirate and the eastern coastal mountains, the typical Arish (regionally spelt Areesh) was a summer house, usually constructed by a family on a date farm during the summer migration period, which was rectangular in shape, with a flat roof and one side left completely open. Only one such Arish building is still being used during the date collection of the three months of summer. It is situated in the village of Hajar Bani Hameed at Wadi Madhah (under the administrative governance of Oman).

The Arish 'romance' in the region is apparent in the everyday use of Arish for car park shelters, all types of shading structures and for the most important civic building of all, the majlis. The majlis has an important social role in every settlement and is as a place where community relationships have been maintained and cultivated for centuries. In the unique landscape of the region, one could say that a majlis is 'a room with a view'. All recorded Arish majlis have been directed towards a fine view, whether of date palm gardens, mountains or sea, and many contained a chair or a few cushions for visitors to sit and contemplate the beauty of the landscape.

# Ras Al Khaimah

The geography of Ras Al Khaimah can be divided into three distinct zones: the mountain range, the coastal plain and the plain between the mountains and the coast, known as Jiri Plain. Date-palm oases on Jiri Plain and archaeological findings from settlements in Shimal prove that the date palm was used for domestic purposes as early as four thousand years ago. The population of Ras Al Khaimah was settled, as there was access to sweet water, food and the Gulf coast. However, summer migrations have been recorded in the area. The region was also known for farming and vegetable cultivation, while in the mountains moderate seasonal rainfall created opportunities for terraced farming.

House in the Galilah area of  
Ras Al Khaimah

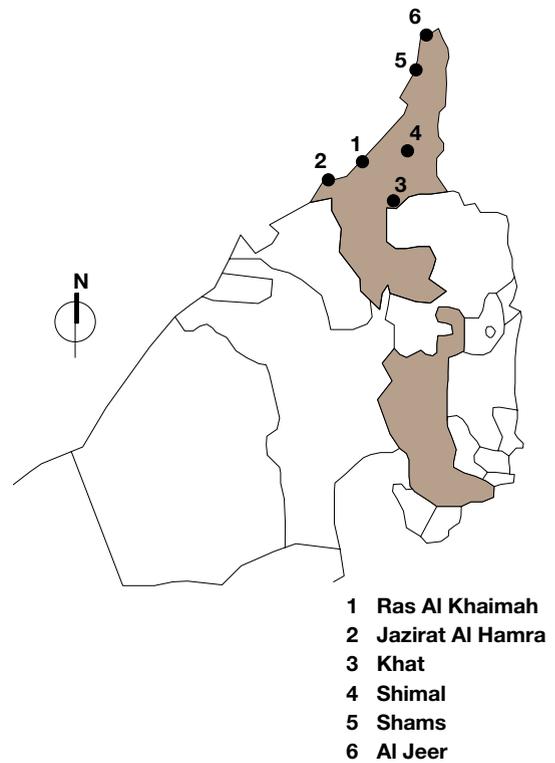
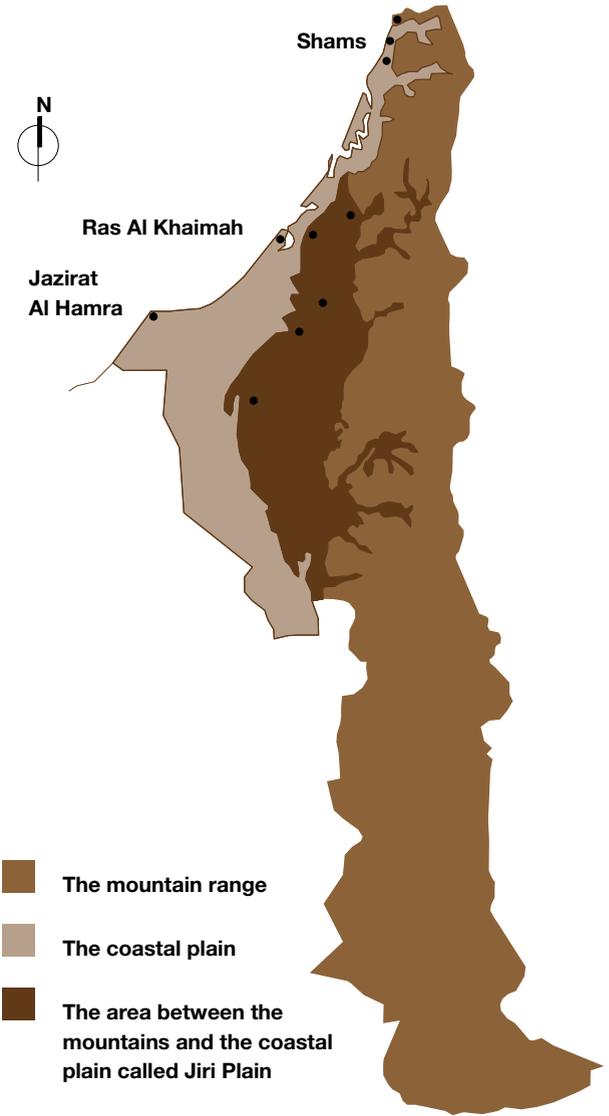


**Archaeology and ethnography**

Pottery from the Ubaid culture, which flourished in Mesopotamia between the sixth and fourth millennia BC, has been discovered in Wadi Haqil tombs. Other archaeological finds at Shimal and Galilah prove the existence of a sophisticated civilization from the second millennium BC. Ras Al Khaimah is by far the best-documented Emirate in terms of archaeology and ethnography. Beatrice De Cardi and Walter Dostal, active in the 1970s, left a great volume of work, which has been continued and supplemented by Dr Anne Coles and archaeologists such as Christian Velde and Imke Moellering.

The most famous ancient settlement on the coast of Ras Al Khaimah was Julfar. Arabic and Persian texts from the 7th century describe the port of Julfar. The city boasted not only its wealth, obtained by the trading of pearls, but also the visit of Vasco de Gama in 1498. The Portuguese built a fort in Julfar, which unfortunately disappeared along with the city. Archaeological excavation at Julfar commenced in the 1970s, yielding pottery dating from the 11th, 14th and 15th centuries (including Chinese ceramics), as well as evidence of the use of palm tree trunks and Arish fronds in houses from the 16th century onwards. Palm-leaf fronds were recessed into the ground to form a support for walls, whereas previously they would have been supported by stones at ground level without being recessed.

In documents from the 1970s collected by the Austrian ethnographer Walter Dostal, we can certainly distinguish khaimah houses, buildings resembling Arish tents, also called khaimah, and kerin houses (similar to those seen in Fujairah Fort, but spelt kerin, not kareem). In all other stone or mud buildings, palm-leaf daan mats were used to form a ceiling above palm or chandel timber beams, similar to the construction methods found at forts throughout the Emirates.



Map of the town and harbour of Ras Al Khaimah in 1819

[opposite] Landscapes of Ras Al Khaimah Emirate, clockwise from top left, Dhaya Fort, Galilah Valley and Khatt Springs area, October 2009

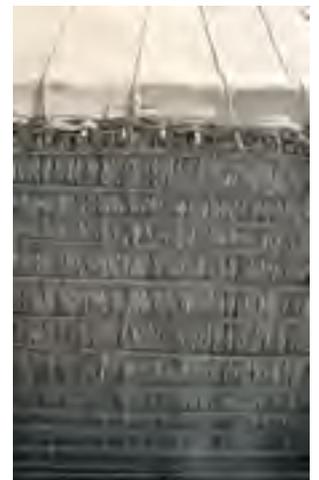


## Khaimah

The khaimah is a pitched-roof Arish building. Typically one family would live in a khaimah, the frame of which was constructed from, on average, eight chandel timber columns and one beam that supported the pitched roof. Walls were made from tightly linked palm-leaf fronds with leaves intact, joined together by fourteen or fifteen horizontal Arish supports, each about 1.8 metres long. On the corner elevations there were some twenty-one horizontal connections, giving the building a total height of around 2.6 metres. It is the number of these horizontal connections that identifies a building as a khaimah or Arish building in Ras Al Khaimah Emirate.

Traditional khaimahs were winter houses with the roof frame made of peeled Arish fronds covered with hassir mats and a fabric. Interior walls were lined with hassir mats or with coloured mats shipped from Egypt or Iran. There was a small area inside the khaimah, separated from the rest by a low wall, used for washing. Sand, earth or hassir mats formed the floor. Traditional khaimahs would have only one door and no windows.

Khaimah at the Ras Al Khaimah dance and cultural club; Abdullah Al Suroomi (below and left; on the left, with Khamis Rasheed Hasser), October 2009

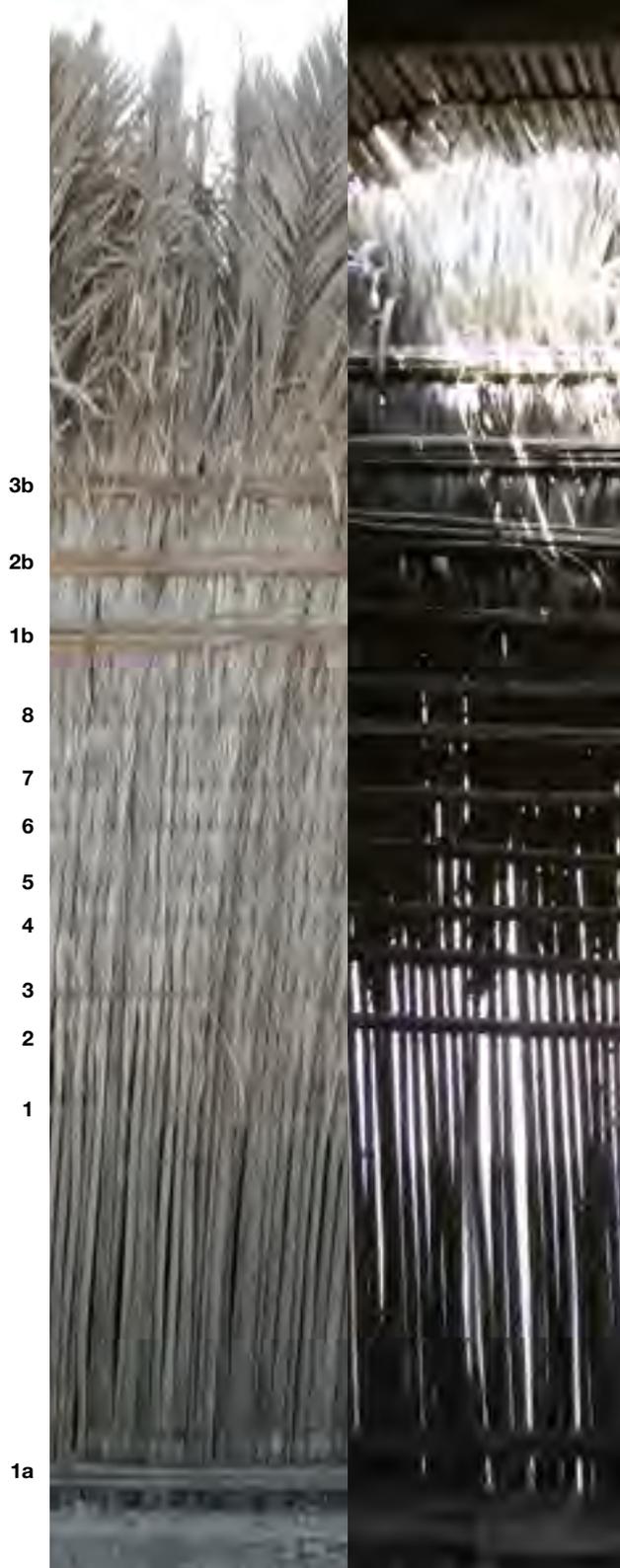




**Arish Mogassas, Ras  
Al Khaimah dance and  
cultural club**

### **Arish Mogassas**

Arish Mogassas and Arish Cayady are superb examples of the sophistication of Arish craft and architectural form. Both building types are unique to the Ras Al Khaimah region and local people still construct them today using traditional methods. The two Arish styles have been in use for generations. They represent an architectural response to climate that exemplifies sustainability in vernacular architecture. The principal difference between Arish Mogassas and Arish Cayady is that Arish Mogassas is an enclosure for the winter (denser Arish spacing) and Arish Cayady is for the summer (looser Arish spacing, allowing the breeze to come through to the interior). Certain rules for their construction are set out overleaf.



## Arish Mogassas

**Season and use**

Winter house for one family

**Walls**

The walls have eight horizontal connections (1–8) with one horizontal support inside the building (1a), and three external horizontal connections (two Arish fronds) linked together with a rope (double joint; 1b–3b)

**Palm leaves for the walls**

Whole, trimmed at the top

**Bathroom**

Internal with level wall made in the same way as external wall

**Ceiling**

Daan mats on chandel timber beams

**Openings**

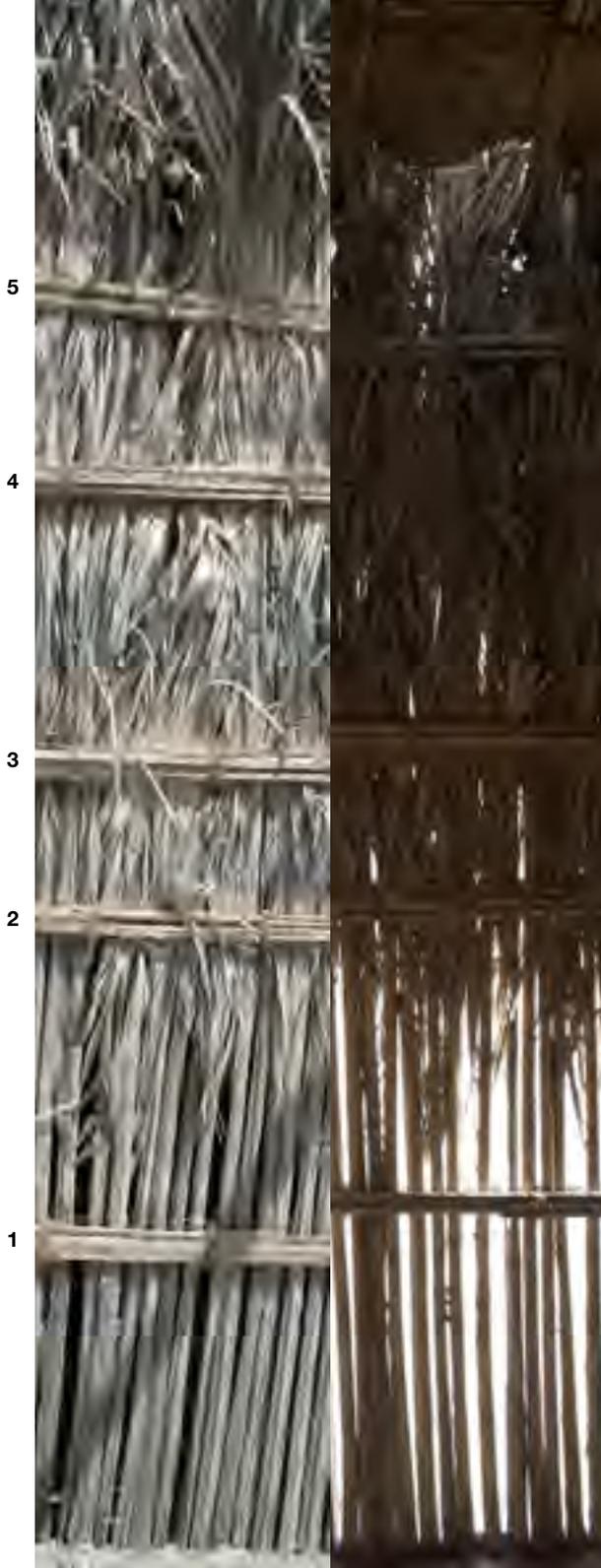
One door, no windows

**Size**

6.9 m length, 3.4 m width, 3.15 m height, bathroom 1 m x 3.4 m

**Built by**

A family (including children)



Comparative analysis of Arish Mogassas and Arish Cayady with typical wall construction variations.  
Ras Al Khaimah dance and cultural club

### Arish Cayady

Season and use  
Walls

Palm leaves for the walls  
Bathroom  
Ceiling  
Openings  
Size  
Built by

Summer house for one family

The walls have five horizontal connections on both sides of the wall, internal and external, (two Arish fronds) linked together with a rope (double joint)

Whole, not trimmed at the top

Internal with low wall made in the same way as external wall

Arish frond frame locally called noshakh covered with hassir mats

One door, no windows

5.6 m length, 2.6 m width, 4 m height, bathroom 1 m x 2.6 m

A family (including children)

### Jazirat Al Hamra and a typical house in the Shimal area

Jazirat Al Hamra (Red Island) is the last authentic traditional town still standing in the United Arab Emirates. The inhabitants of this island subsisted on maritime activities and pearl trading before the houses were abandoned.

Jazirat Al Hamra shows all elements of a traditional town, including a fortress for defence, a small market (souk), several mosques and variety of houses.<sup>11</sup>

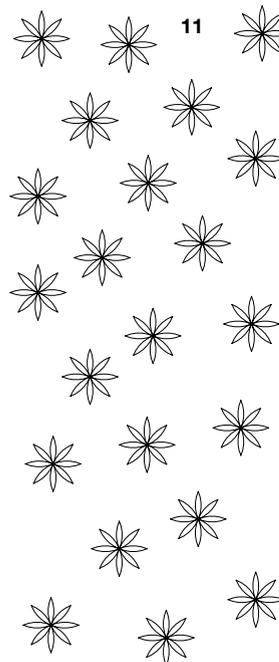
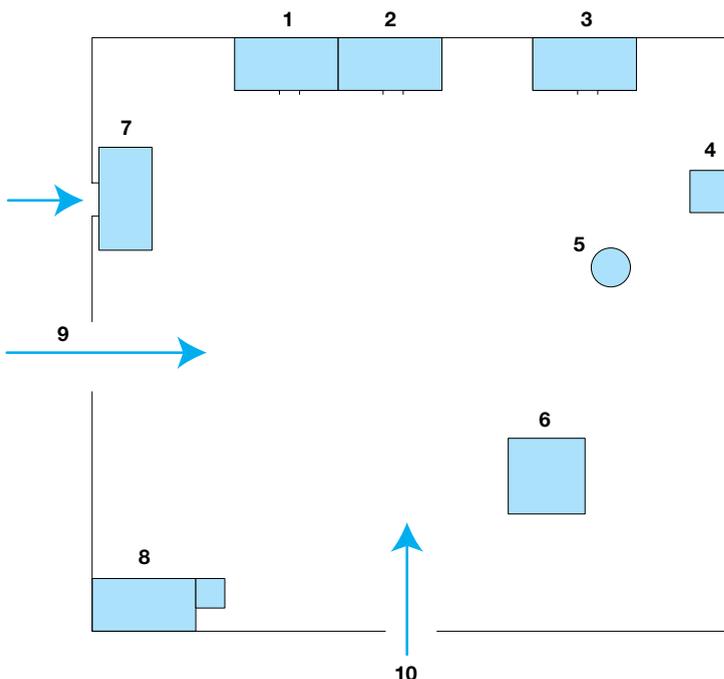
Jazirat Al Hamra perfectly exemplifies the longevity of Arish. Since the village was abandoned by the Al Zaabi tribe in the 1960s, the condition of most of the houses deteriorated, yet beautifully woven Arish mats that form part of the ceilings are still intact after almost fifty years' exposure to the elements, proving that the material has at least the life span of concrete.

The Al Zaabis were mainly fishermen and they were one of the very few tribes in the Ras Al Khaimah region who took part in the summer migration for the collection of dates. Having moved to the village of Khatt, the entire family would construct Arish houses for the summer. The Arish would be cut from the trees, left to dry, soaked in water for three or four days and, when slightly dried, used for construction. It took only about a day to build a house. During very hot weather the entire family would sleep outside on a large Arish bed called manamh, raised a metre or so above the ground.<sup>12</sup>

[opposite above] One of a very few authentic Arish Mogassas majlis left in Shimal area

[opposite below] Arish Cayady and an enclosure from stone

Al Suroomi household in Shimal (Ras Al Khaimah)<sup>13</sup>



- 1 House for one family (with children)
- 2 House for grandmother and grandfather
- 3 House for one family (with children)
- 4 Bathroom
- 5 Well
- 6 Kitchen
- 7 Majlis for men (separate entry)
- 8 House for uncle with his family
- 9 Entry
- 10 Entry
- 11 Date palm oasis



# Umm Al Quwain

The coast of the Arabian Gulf is sprinkled with a number of small islands, some of which have drinkable water and hence are suitable for human settlement. In many cases the islands are surrounded by mangroves, whose fauna and flora are sources of food. Umm Al Quwain Emirate has this unique typology of islands and mangroves in the north. A desert plain connects the north with the rocky areas at the foot of the Al Hajar mountains in the south.



### Archaeology and the city

Recently a French archaeological mission to the island of Akab at Umm Al Quwain discovered one of the oldest sanctuaries in Arabia, dating back to 3500–3200 BC, as well as a Neolithic ceremonial site dedicated to a remarkable marine mammal, the dugong (*Dugong dugon*). According to reports in the *International Review of Antiquity*, Akab was a fishing village between 4700 and 4100 BC, like other villages on islands off the coast of Umm Al Quwain. Other archaeological finds inland on the Ed-dour (meaning ‘the houses’) site provide evidence of a civilization dating back to the Umm an-Nar period (third millennium BC), which developed through the centuries to become one of the largest Roman settlements in the region. Archaeologist Christian Velde reports that Carl Phillips’s observations on the Ed-dour site were that, apart from excavated houses, about 80 per cent of the area was empty, suggesting that originally there were palm-leaf houses in between stone buildings.

Aerial photos taken by the British RAF in 1935 show an organic coastal city with houses defined by Arish courtyards. The city demonstrates the tribal nature of the society by the proximity of the settlements to each other and the arrangement of houses in organic clusters. The khaimah was the predominant building form until coral came into use. Umm Al Quwain old city today shows Iranian influence, manifest in the wind tower houses. Two watch towers remain, along with the city wall and a gate that would be closed at night and open by day, in order to protect the city, like the fortifications of medieval cities in Europe.

### Palm-leaf interiors

The recent history of Umm Al Quwain dates back to the 18th century, when the Al Ali tribe moved their capital from Al Sinniyah island to its present site after the sweet water supply dried up. Similar patterns of migration in search of drinking water have been observed in Ras Al Khaimah and Ajman. In 1775 Sheikh Majid Al Mualla, founder of the ruling Al Mualla section of the Al Ali tribe, established an independent sheikhdom in Umm Al Quwain. Construction of the fort that now houses the Umm Al Quwain Museum started in 1768.

An example of Arish building is displayed at the museum, an interesting model of an Arish interior with all its furniture and everyday objects, including a mirror, bed, pot holding water and a small sitting area. The translucence of the walls and the beams of light passing through the palm leaves make for a poetic space.

[opposite] Arish interiors in  
Umm Al Quwain Fort and  
Museum, October 2009

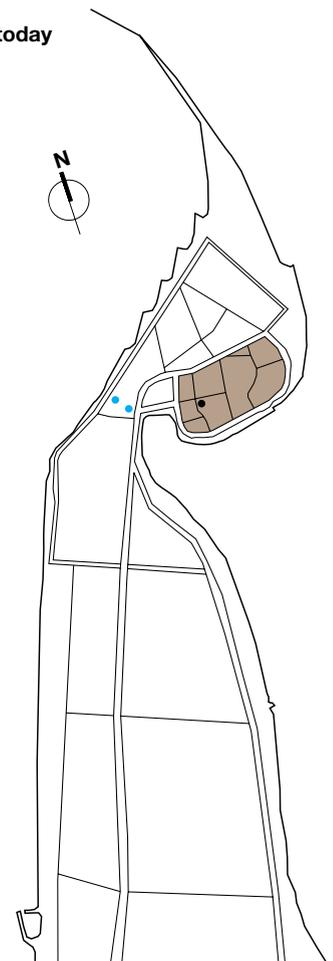
#### Umm Al Quwain Emirate

- 1 Umm Al Quwain
- 2 Falaj Al Mualla



#### City of Umm Al Quwain today

- Fort
- Watch towers
- Old town area





## Seasonal migrations

There have been two types of tribal migrations in Umm Al Quwain Emirate: one route was from the coast of Umm Al Quwain old town to inland Falaj Al Mualla, and the other within the Falaj Al Mualla territory between the three settlements of Biyatah, Al Rashidiya and Falaj Al Mualla.

There was water in Falaj Al Mualla, which was situated close to Al Dhaid in the foothills of the Fujairah mountains. The Bedu in the inland area practised seasonal migrations and relocated between these three villages every two or three months, according to the winds. This is why the houses had to be simply constructed – so that the family could erect and dismantle them easily.

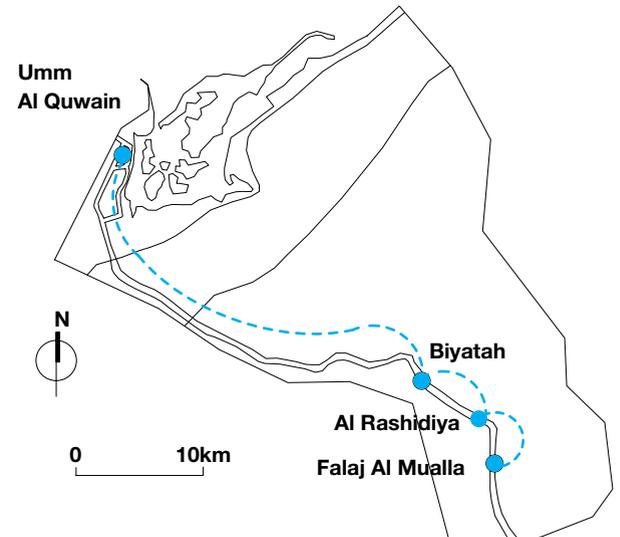
According to accounts of the Al Ghafly family, as told by Mrs Alayaa Mohamed Al Ghafly, Director of the Umm Al Quwain Museum, a typical settlement comprised a tent (made from a woven fabric produced by women) and two or three simple Arish enclosures, one of which was a kitchen. All buildings were arranged in a circle without a fence and with a fireplace at the centre. There would be around five or six families living together. The spatial organization of semi-circular Bedu enclosures is shown opposite. Notice how they were positioned facing away from their neighbours in order to respect the privacy of each family. The number of clusters – five or six – in one Bedu settlement was about the same as in Liwa or in urban Arish settlements along the coast.<sup>14</sup>

## Hassan Ali Hassan Al Ali's Arish

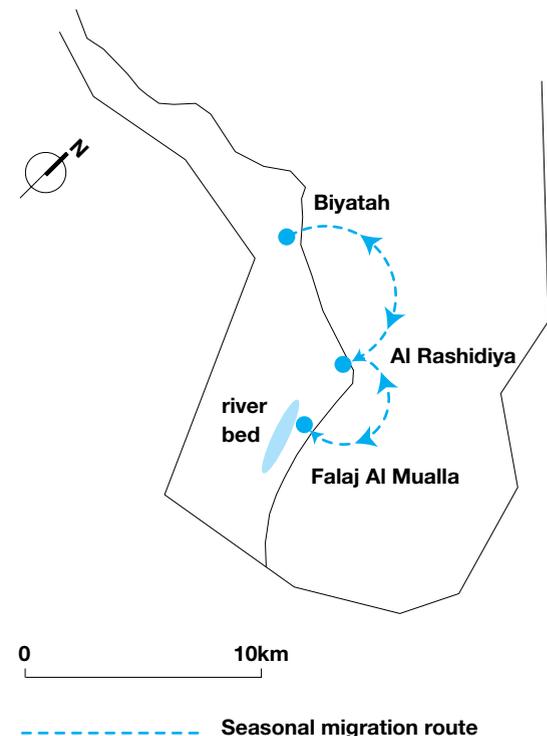
A few hundred metres away from the Falaj Al Mualla Fort is the house of Mr Hassan Ali Hassan Al Ali, an 82-year-old Bedu, one of two remaining people in the village who know how to put palm-leaf buildings together. Mr Al Ali constructed two Arish houses for his family, the khaimah (pictured opposite) in particular being used in winter for small picnics. Interestingly, a meal was cooked on an open fire in these Arish buildings during the winter months. The buildings are beautifully crafted, and show the consummate skill with which the builder fastened the dried palm leaves together with rope. Waterproofing was done by applying a layer of bitumen, a common practice in the last fifty years. Each khaimah was home to up to ten people. The khaimah in Falaj Al Mualla was a winter house, whereas the Arish was used in summer, including external manamh beds. In the past there were some sixty to a hundred people in Falaj Al Mualla, from the Al Ali, Al Afily and Al Ketiby tribes.

I am grateful to Mr Al Ali for granting me an interview and in particular to Amna and Shania, two of his young daughters, who kindly assisted with translation, his sons being in Thailand at the time. One sincerely hopes that the knowledge of this remarkable person, who was a guard to Sheikh Al Mualla, can be transferred to the younger Emirati generation, so as to keep the techniques and skills of Arish construction alive.

Tribal migration from Umm Al Quwain on the coast to Falaj Al Mualla



Bedu migrations in Falaj Mualla territory





[above] Khaimah interiors in Falaj Al Mualla, constructed by Hassan Ali Hassan Al Ali, October 2009

Traditional Bedu settlements in Falaj Mualla territory

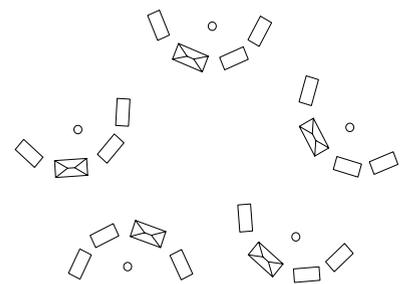
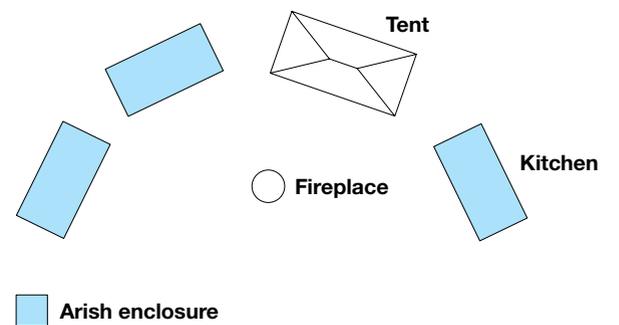


Diagram of a typical Bedu settlement in Falaj Mualla territory



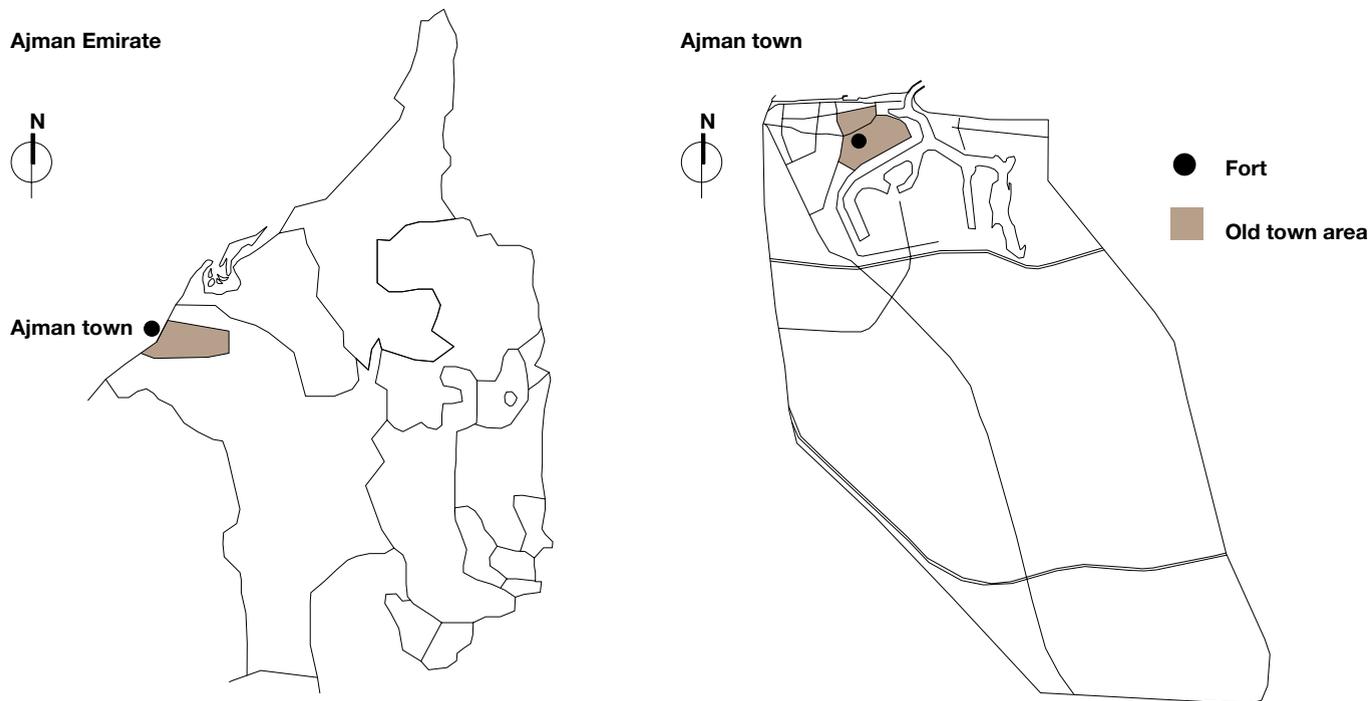
# Ajman

Between Umm Al Quwain and Sharjah lies Ajman, the smallest Emirate in the UAE, its existence within the federation demonstrating a respect for tribal society and the individuals who belong to it. Archaeological excavations at the Al Moayhat site provide evidence of burial sites and artefacts from the Umm an Nar culture (third millennium BC) that existed on the Gulf coast in what are now the northern Emirates. The Al Nuaimi, the ruling family of Ajman, belong to the Qahtani tribe from Khazraj, in present-day Iraq, who migrated from Yethreb in pre-Islamic times, along with emigrants from Yemen after the collapse of the Ma'reb Dam in AD 120. Some of the family moved to the Buraimi valley, whereas a smaller number settled in the coastal area, founding the present Emirate of Ajman. Sheikh Rashid I, who came to power in 1804, is considered to be the founder of the Al Nuaimi dynasty and his descendant, Sheikh Humaid Bin Rashid Al Nuaimi, emir since 1981, is credited with the development of Ajman from a small fishing village to a modern Emirate.<sup>15</sup>



Ajman Fort was built in 1775 and according to records from the Ajman Museum it has many of the characteristics of a Portuguese defensive fort. Today the spectacular and quite complex building, transformed into a museum, has an authentic working wind tower, one of the very few remaining in the UAE. From 1775 to 1980, the people of Ajman lived in khaimahs made from palm-tree leaves and houses built from coral stone.

[opposite] Reconstructed  
Arish house in Ajman,  
October 2009



[left] Typical Arish, unique to Ajman Emirate, drawn by Ibrahim Awadi. Highlighted in brown: location of the Arish summer house



**Urban summer migrations and a typical house**

Mr Ibrahim Mohamed Salem Awadi was introduced to me by a Director of Ajman Museum, Mr Ali Mohammed Al Matroushi. Mr Awadi has been working for the Ajman Museum for the past 23 years and constructed all the Arish buildings displayed in the museum grounds. His memories of the past are vivid and thought-provoking.

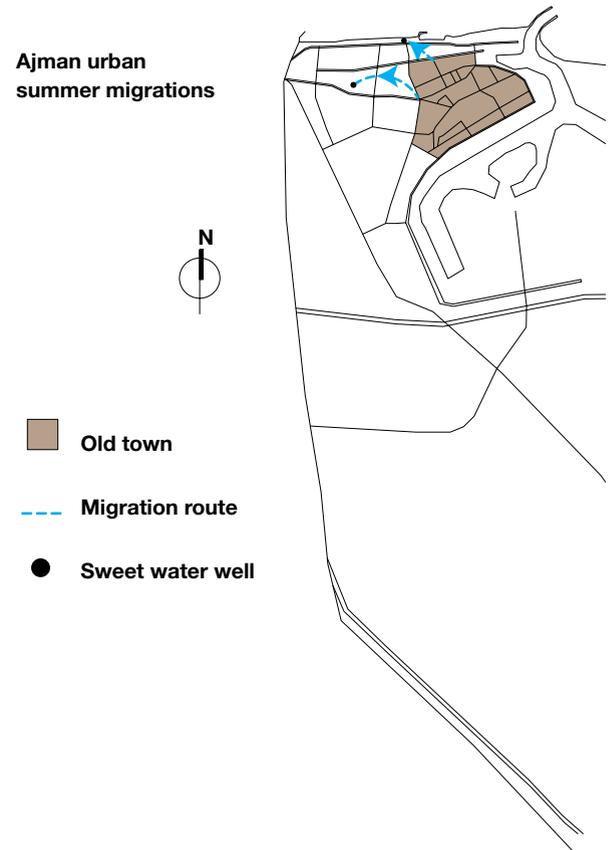
Ajman’s population was settled, rather than migratory, with some influx of people from other countries. It was possible to recognize Emirati families’ households as those that were surrounded by an Arish fence. The expatriate community lived in individual khaimah houses. Apart from buildings constructed from the palm leaves, there was a percentage made from coral stone and mud, similar in architectural style to those that can still be seen in Umm Al Quwain and Ras Al Khaimah. Most of the Ajman population lived in Arish khaimah houses in the winter and constructed a separate Arish house with a wind tower near the khaimah or further away within the palm-leaf courtyard (see diagram right below). In summer, some residents would migrate to other areas of Ajman to be near sources of fresh water, and here people would construct temporary Arish houses. There are no date palm oases in Ajman; therefore there was no natural supply of the material. Palm fronds were shipped by boat from Ras Al Khaimah or delivered by Bedu from the Masafi area. In both cases, Arish was supplied loose and daan mats were made by families on the beach. The Arish would be soaked in sea water and put on the sand to dry prior to construction.

**Palm-leaf house in Ajman**

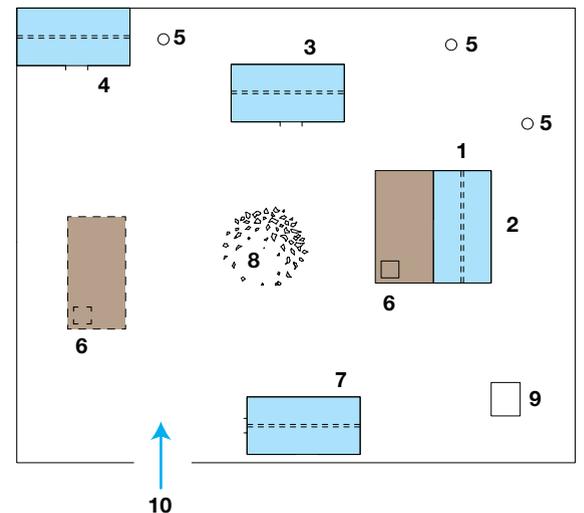
Construction of khaimahs in Ajman was almost identical to that of khaimahs in Ras Al Khaimah and Umm Al Quwain. The summer palm-leaf houses, however, had a few unique details found only in Ajman. The Arish peeled from the leaves was used for the construction of the walls and tightly put together, at regular intervals, with relatively small gaps in between. All the external walls were about 2.3 metres high and since the wall did not act as a means of ventilation to admit the breeze, there was a 50 cm gap left between the top of the wall and the roof for air circulation. Uniquely to Ajman, sailing yacht linen was used to cover this gap. In addition, thanks to Iranian influence, a wind tower or barjeel would be added to facilitate natural ventilation of the Arish interiors. Beds were usually placed next to the wind tower and in the opposite corner there would be a small enclosure for the bathroom, as was customary in the khaimah. Small, high windows would act as ventilation devices, and a typical Ajman Arish would have one or two doors.<sup>16</sup>

*Heritage has to be understood ‘by hand’.*  
Ibrahim Mohamed Salem Awadi, Ajman

[opposite] Khaimah and a reconstruction of a typical summer Arish in Ajman Museum



A typical house in Ajman<sup>17</sup>



- |   |  |
|---|--|
| 1 Khaimah 1                             | 6 Arish summer houses with a wind tower (optional locations) |
| 2 Space between khaimah and Arish fence | 7 Majlis   |
| 3 Khaimah 2                             | 8 Tree   |
| 4 Kitchen                               | 9 Shelter for animals  |
| 5 Well (optional locations)             | 10 Main entry  |



# Sharjah

It is impossible to say how much the landscape at archaeological sites has changed over thousands of years, but we may surmise that coastal and mountain areas have not changed a great deal. Surveys carried out at archaeological sites in Sharjah Emirate indicate that palm trees were used for domestic purposes and construction. One of the oldest texts we have, printed in Venice in 1590, is a record of Gasparo Balbi's travels to East India, which contains the names Dibeï (modern Dubai), Sarba (Sharjah) and Agiman (Ajman).

A map of Sharjah, dating from 1820, was printed in two distinct colours indicating urban forms. Judging from later photographs, it is probable that the buildings coloured pink on the map are constructed from coral and mud, whereas those coloured black were made from palm leaves. There was evidently a close link between the towns of Sharjah and Dubai at that time.

**Mangroves on the coastal  
line of Sharjah Emirate in  
Al Hamriyah area**



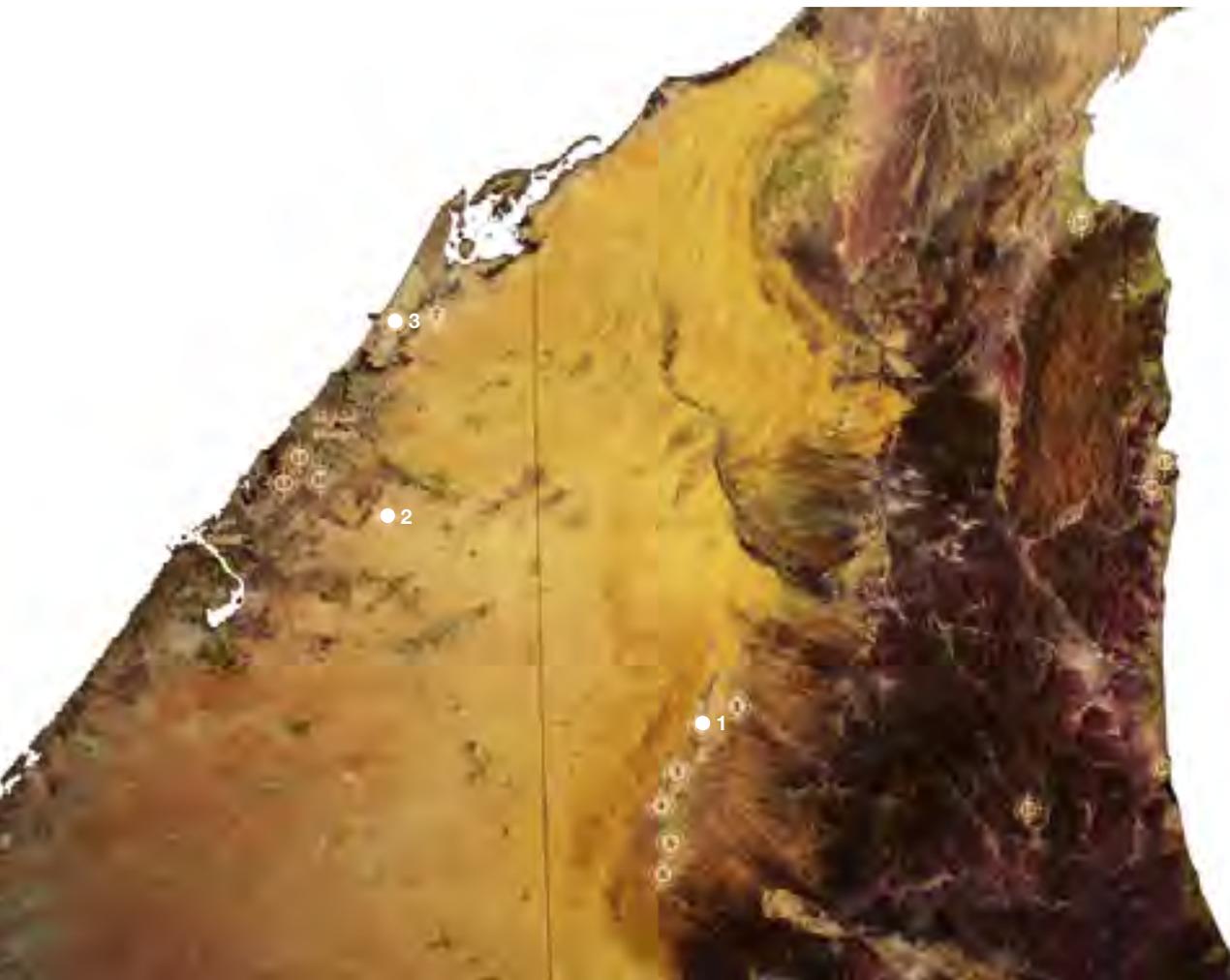
**The primary archaeological sites identified are marked below:**

- 1 Mleiha,<sup>18</sup> including areas extending south to Al Madam oasis at the foot of the Hajar mountains
- 2 Muweilah, with its inland desert landscape
- 3 The coastal areas close to Al Hamriya, with lagoons and mangroves.

The most significant finds related to the use of palm leaves are from the Mleiha site, as described in this chapter.

The coastal lagoons and mangroves were a plentiful source of shellfish in the spring. Large numbers of shell mounds and other artefacts provide evidence of the consumption of shellfish. Many of the samples collected were from the late fifth and fourth millennia BC. Pottery from the Iron Age and Hellenistic period was further evidence of human habitation. It is assumed that large stone slabs would have held palm-leaf structures, constituting temporary housing erected for the seasonal collection of shellfish.

There is also evidence of an Iron Age settlement at the Muweilah site, founded between 850 and 800 BC and destroyed by fire around 600 BC. Here, large quantities of date stones and palm trunks for posts have been found. Archaeologists assume that palm-leaf walls would have formed an enclosure between the palm-tree posts.



Satellite map of Sharjah Emirate, showing locations of significant archaeological sites



[above] Mleiha mud bricks from a tomb dated to 150 BC, with impressed patterns of round palm-leaf mats. These mats of c. 2 m diameter were used for drying the palm leaves. March 2010

[above right] A similar hassir mat still in use today; from Sharjah Traditional Handicraft Centre

### **Mleiha archaeological site**

Mleiha was an important settlement at the foot of Jebel Faiyah that flourished for around 600 years from 300 BC to AD 300. So remarkable is this site in archaeological terms that it is probably justified to call its time period the 'Mleiha civilization'.

The social advancement of the inhabitants of Mleiha is incontrovertibly expressed through art, pottery, jewellery, a large castle, coins and highly sophisticated tombs. Trading was carried out here, not only with the ed-Dour site close to the Umm Al Quwain coast but also with Mesopotamia, Rome and the Greek island of Rhodes.

The palm-tree imprints pictured above are from laying mud bricks to dry on what are today known as hassir mats, woven into a circle some 180 cm in diameter. The many tomb chambers discovered at Mleiha would have contained up to a thousand corpses. The inscription 'Mara'shams' in the Aramaic language, meaning 'man of the sun' or 'God of the sun', may indicate an ancient form of worship during the late pre-Islamic era.<sup>19</sup>

According to the 1938 edition of the annual *Almanach de Gotha*, published by Justus Perthes, and made available to us by Dr Sultan Al Qassimi of the Centre of Gulf Studies, the populations of the Pirate Coast (Trucial Coast) cities were: Abou Dhabi 6,000, Baraimi 5,000, Dibai (incl. Derai) 5,000, Ras el Khaima 5,000 and Chardja 15,000.

This means that Sharjah was then three times bigger than the other Trucial Coast cities; it was most likely also the wealthiest. The Al Qassimi tribe ruled Sharjah from the 18th century and in 1820 Sheikh Sultan I signed the General Maritime Treaty with Britain, accepting a protectorate to keep the Ottoman Turks out. Sharjah's position on the route to India made it important enough to be recognized as a Trucial State.

### Sharjah city from 1930

At a time when Sharjah's inhabitants depended on pearling and fishing for their livelihood, they received a boost from the establishment of a staging post for Imperial Airways' flying boats en route to India. Photographs taken by British pilots in the 1930s (opposite) allow us to explore the urban fabric of the city and the presence of settlements constructed from palm leaves.

The ethnic roots of the population were and still are mixed. The main groups of foreigners were Iranians, then Pakistanis, then, some way below these two groups in terms of numbers, Indians, followed by Arabs from beyond the Trucial States. There were also, as in Dubai, a few migrants from the other Trucial States, who did not count as foreigners.

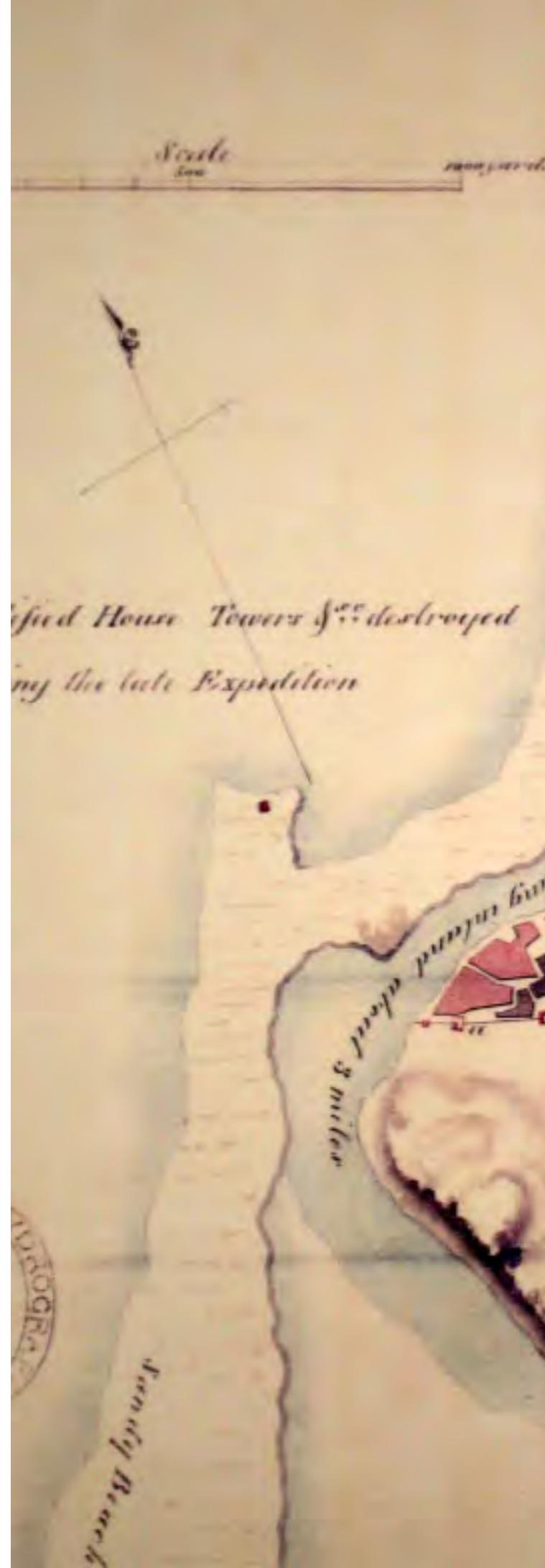
According to Sharjah's Director of Heritage and Cultural Affairs, Mr Abdulaziz Abdulrahman Al Musallam, a new person arriving in Sharjah would go to a mosque for assistance with accommodation and so-called 'faza' charity would be offered. A temporary house (yerid) made from palm trees would be provided as accommodation. A person or family would stay in it for a few months or a few years until they could afford to build a permanent house. The term yerid, which included khaimahs and Arish, referred not just to summer houses but to temporary housing in general.

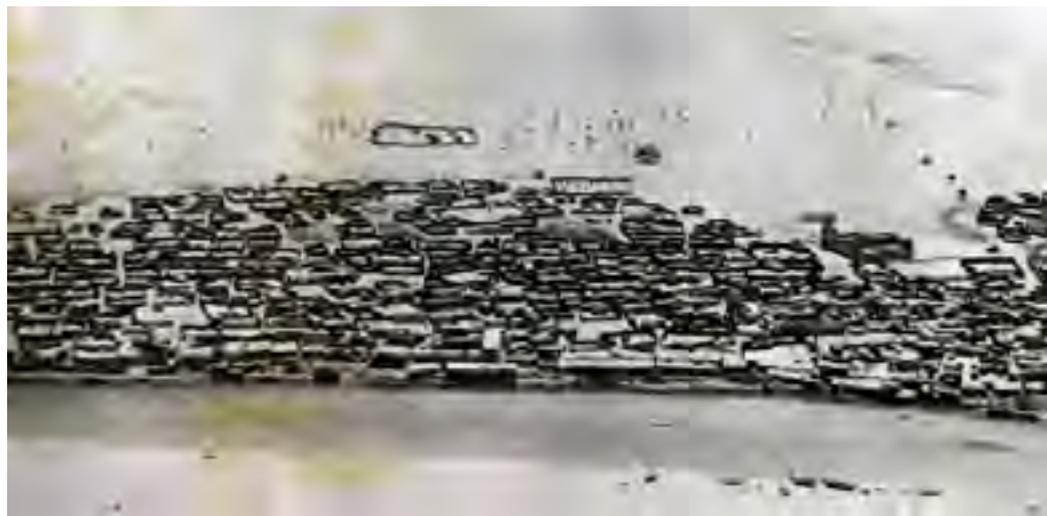
### Diversity of the city fabric

It was the space required for a person to walk while carrying a shoulder pole with water containers suspended at either end that governed the gaps between buildings, which were about two metres. The city was quite densely built, with constructions from coral as well as from palm leaves. The fires that occurred would have spread rapidly and completely destroyed Arish houses.

Palm leaves were used as a building material not only in houses and fences but also in structures around the sea front, shops in the markets and shelters from the sun among the narrow streets of the souks, important centres of commerce.

No natural oasis settings existed in the northern part of Sharjah. Palm leaves would have been brought on camels by local Bedu from the areas of Dhaid or Ras Al Khaimah and from Oman by sea, often already banded together in daan mats. The method of weaving these daan mats varied: local tribes would never cut the top off the palm leaves, whereas imported daan mats were trimmed into regular rectangular shapes. Poorer people would also build a shelter from anything to hand, even water containers, although palm fronds were still the preferred material for the roof.





[left] Map of Sharjah city in 1820

[top] An aerial photograph of Sharjah in 1935, from the British Airways archives.

[above] An aerial photograph of Sharjah in the 1930s

Images of the city from 1951 show its physical and social diversity. Wealthy people lived in buildings made from coral stone and poorer people in palm-leaf houses. In addition to traditional khaimahs and Arish summer houses, the Baluch nation – incomers from Iran and present-day Pakistan – constructed circular palm-leaf houses resembling the yurts of central Asia. The same Baluchi houses were in Ras Al Khaimah, and it is possible that trade between the two Emirates, supported by the tribal ties of the ruling Al Qassimi family of Sharjah and Ras Al Khaimah, allowed economic migrations to take place.

### **A typical house**

A typical house in Sharjah would have very similar components to houses seen in other towns on the Trucial Coast. The khaimah was a predominant building form, housing one family. Inside, there was a small segregated area for washing of the body only. The method of construction of khaimahs was the same as described in the chapter on Ras Al Khaimah.

Within a settlement, surrounded by a palm-leaf fence, there would be a kitchen with a nearby well and a bathroom. In the summer an additional Arish house would be built, with a wind tower made from sailing fabric and a gap between wall and ceiling for the wind to enter (as in Ajman Arish summer houses). Some families slept in an outdoor bed, called a manamh, in summer and a separate enclosure for men, a majlis, was set aside in some houses. Overall, it was individual preference that determined where khaimahs and Arish houses were placed in the Arish courtyard. The whole village community built the houses, sometimes aided by Arish master craftsmen from the locality, from another Emirate or even from another country, such as Iran.

### **Al Hamriyah and seasonal migrations**

Al Hamriyah is a small fishing village situated between Ajman and Umm Al Quwain, which shares the coastal geography of Sharjah. Historically, its economy depended on a pearling industry that was sufficiently profitable to justify its attempts, in the 1930s, to become independent, along with other Trucial States, but for political reasons this ambition was not realized. In 1970 the village had about ten khaimahs and even today, inhabitants of Al Hamriyah migrate in the summer to inland farms with Arish buildings. They are rectangular houses with flat roofs and door openings in the longer wall, as shown in the photograph opposite.

From Sharjah city too, families migrated during the summer to areas close by, such as Al Falaj or Al Ghuabaiba, where there was access to fresh water, or to open spaces called baraha. There they lived in Arish houses, which looked much like those seen in the Al Hamriyah area. Sometimes Arish houses were built for women and children only, and men slept outdoors on a manamh or summer bed.

Some families travelled a great deal further afield for the summer, hiring camels and Bedu to journey in caravans of up to thirty people to places on the east coast, such as Dibba or Al Dhaid.<sup>20</sup>

### **Intangible heritage**

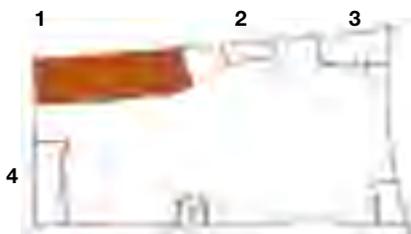
From archaeological evidence, we can trace the existence of a palm-leaf vernacular architecture in Sharjah back two thousand years, to at least as far back as 250 BC. Thanks to the wise leadership of Sheikh Sultan Bin Muhammad Al Qassimi, Arabic and Islamic culture in Sharjah Emirate has been lovingly preserved and its artefacts displayed in what are arguably the best museums in the UAE.



New Al Hamriyah, sea structure and reconstructed khaimah in Sharjah heritage village, February 2010



It is highly regrettable that modern Emirati cities have been built with such speed that legislation was not enacted in time to protect tradition and provide reasons and incentives for aspects of vernacular architecture to be incorporated into contemporary structures. However, all is not yet lost: vibrant cultural programmes and excellent universities offer hope that traditional design will be cherished and emulated in modern buildings, to link them to the local climate, history and authentic culture.



[left] A typical house in Sharjah by Khaled Al Almari

- 1 Arish (summer house)
- 2 Khaimah (winter house)
- 3 Kitchen
- 4 Majlis for men
- 5 Entry
- 6 Bathroom

# Dubai

In 1833, about eight hundred people of the Al Bu Falasah section of the Bani Yas tribe seceded from Abu Dhabi and settled in Dubai. Their leaders, Úbaid Bin Said and Maktum Bin Buti, ruled until the death of the latter in 1852, establishing the dynasty of the Al Maktum rulers of Dubai. Thanks to its location, with its creek extending inland, and the prosperous pearling trade, Dubai became one of the busiest ports in the Trucial States.

Dr Frauke Heard-Bey<sup>21</sup> points out that the population of Dubai in 1910 was more mixed than that of Abu Dhabi and Sharjah, including members of the Bani Yas tribe, Arabs from Bahrain, Kuwait and the Persian coast, and people from Sudan, Baluchi and British India. The development of the city was governed by one important fact: in Dubai, workers and their families stayed in the city all year round, unlike in Abu Dhabi, where men employed in pearling would come from the desert, leaving their families behind for the season.

Reconstructed wind tower  
in the Majlis in Bastakya,  
Dubai



### The city and urban form

Sheikh Rashid Al Maktoum was the force behind two initiatives that contributed to the expansion of Dubai: improvements to the creek in 1958–59 to enable ships to sail inland and a harbour project to accommodate large vessels in 1964. The population growth at that time was unprecedented: from 59,000 in 1967 to an estimated 120,000 in 1973, by which time the new harbour was bringing significant benefits to the city.

Even before the expansion of the creek, the need had become apparent to accommodate the growing population, which was not migrating seasonally and was constantly increasing through immigration. As in Sharjah, elaborate courtyard houses made from coral stone were built on both sides of the creek. Interspersed with these beautiful private dwellings were houses and courtyard settlements constructed from palm leaves. About half of the houses were made of palm leaves and the other half masonry structures of Iranian influence, though there was an increase in Arish housing and other buildings with different functions in the 1960s.

### Use of palm leaf in different building functions

When the city became a trading hub, it needed to provide areas at the creek edge for the loading and unloading of materials. In Wilfred Thesiger's photographs, taken in May 1948, we see khaimahs and markets jostling up against each other. Although land closest to the creek was the most expensive, it was also the most densely built up, as compared with the spacious residential quarter further away.

Trade naturally boosted commerce, and accordingly souks, markets and small shops sprang up in profusion, characteristically along narrow streets shaded by daan mats, as in Sharjah. A great many photographs from this period show streets both beautifully lit and coolly shaded, with beams of sun penetrating through artfully arranged palm leaves. The use of palm fronds for the interiors of shops and above coffee shops remains an attractive feature.

From Dr Anne Coles's personal memories of Arish in the early 1970s,<sup>22</sup> we learn that 'Areesh was also used for fishing huts, seasonal houses, modest shops and shelters for jobs such as blacksmithing and auto repairs. And as fencing for animal pens and animal shelters. All these existed in Dubai and its outskirts as well as houses.'

### Wind tower

In the city, wind towers were built to cool houses in the extreme heat of summer. They achieved this by channelling air throughout the house. The population of Dubai did not migrate as often as the peoples along the Indian Ocean coasts or Um Al Quwain, for example, mainly because they were mostly not local migrants from other Gulf states, but also because those who were employed in the city had to reside there continuously all year round.

Wind towers were, in fact, a Persian invention, and were used for cooling both masonry and palm-leaf houses. Chandel timber (hardwood planks about four metres long) was used as a structural frame, daan mats for the roof and linen as a partition within the tower to channel the wind. Next to the pitched-roof khaimahs, an additional flat roof extension would be constructed to house the wind tower in the summer. It was this type of building that was called Arish in Dubai.

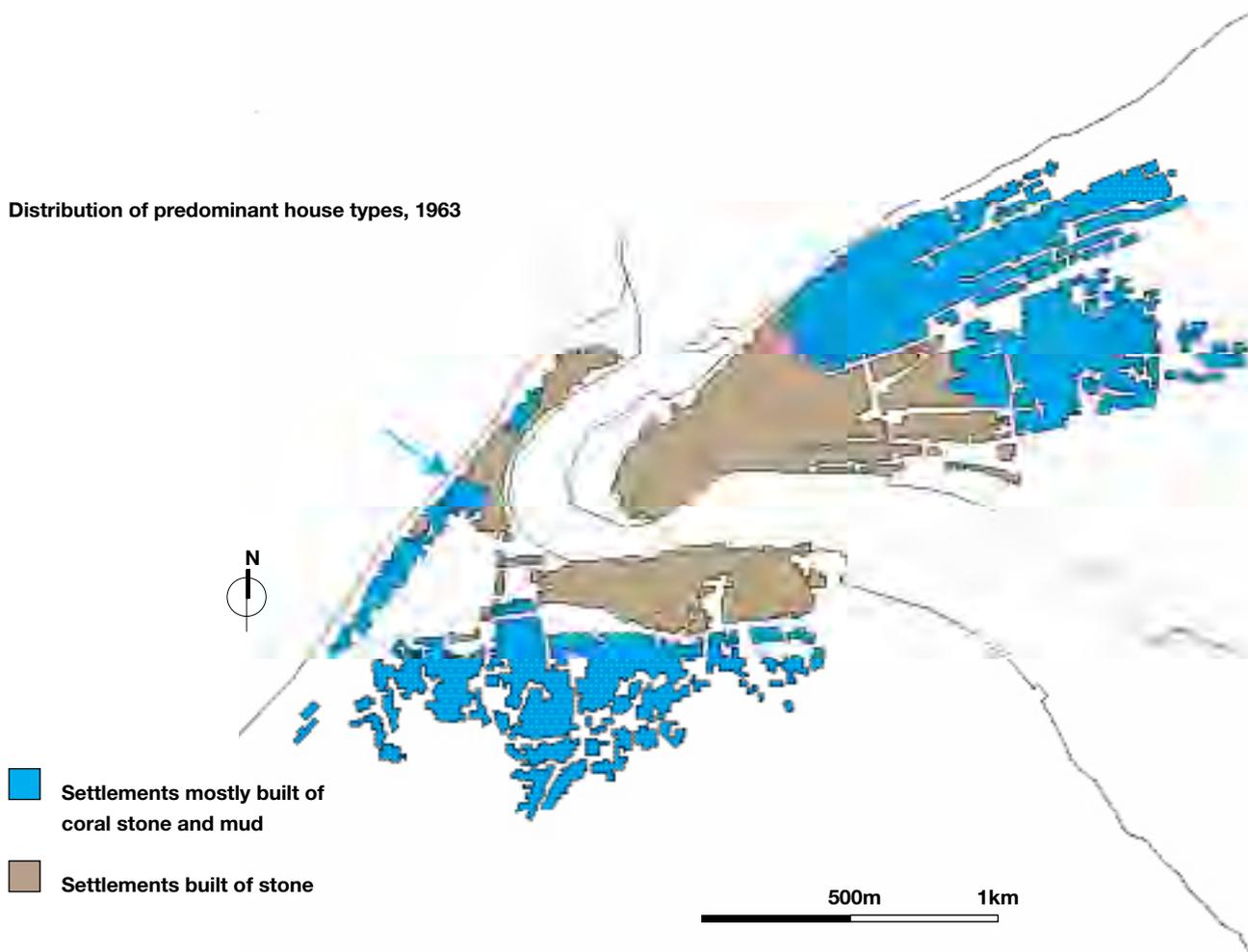
According to research carried out by Dr Anne Coles in 1970, there were some 1,500 wind towers erected on Arish buildings.



[top] A wind tower, 1970,  
Dubai Deira

[above] Dubai souk, 1948

Distribution of predominant house types, 1963



Section of Shindagha area, around 1960



### A typical palm-leaf house

A typical Dubai house was a combination of khaimah (pitched-roof house, as in all towns on the Gulf coast), with the addition of a palm-leaf Arish flat-roofed extension at the front. Pictured right and opposite are a plan and reconstruction of this type of house at Dubai Museum, showing the customary spatial arrangements. There would be one family to each khaimah, containing an area about a metre wide for washing of the body. Sometimes the Arish house would be detached from the khaimah, although always within the household fence. Occasionally, within a large courtyard area, surrounded by an Arish fence, the household would be separated into two equal halves, to accommodate male and female areas.

The density of settlements, which were culturally mixed, made them prone to fire, and on many occasions entire palm-leaf quarters would burn down. In spite of legislation forbidding the construction of palm-leaf dwellings, these houses continued to be built. In Liwa, for example, the destruction by fire of Arish houses built by the indigenous Bedu people was never officially recorded.

### Palm leaf and other building materials

One characteristic of vernacular architecture was the use of local natural materials – mainly stone, mud or palm fronds. However, photographs and conversations with local people make it obvious that buildings were put together from a variety of other materials, such as rice bags and tea cartons. It seems that almost anything that could be used was used.

### Palm leaf

Khaimahs with pitched roofs, which have a grid as a secondary support, were made from individual stripped palm fronds. The palm leaf has a palm frond, around four metres long, off which grow many small leaves about 50 cm long. These small leaves, called khus in Arabic, are normally stripped off the palm fronds. Ready-made chequered-pattern mats were an alternative method of roof construction.

### Daan mats

The Emirates has a long and diverse history of using daan mats in the building of palm-leaf houses. They were prefabricated and could be fashioned off-site. Almost every region has its own design for linking palm leaves together into daan mats. In Dubai and some of the coastal towns, daan mats were imported from Oman – sadly, these are connected differently and hence do not resemble traditional Bedu daan mats.

### Coral stone

Used predominantly for masonry buildings. Archaeologists confirm that a support of palm fronds at ground level with coral stone was a technique used in Ras Al Khaimah up to the 16th century.

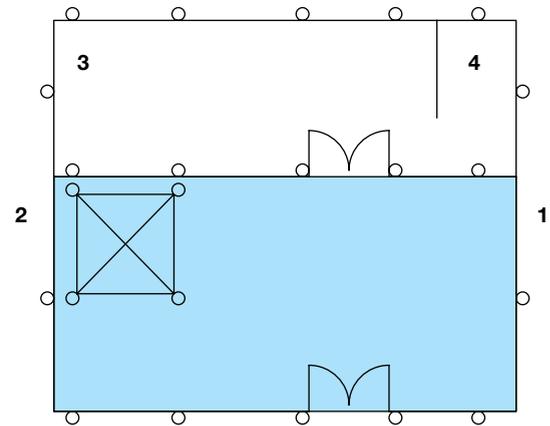
### Rice bags

Rice has always formed an important part of the Emirati diet. It was not unusual to see wind towers composed of rice bags.

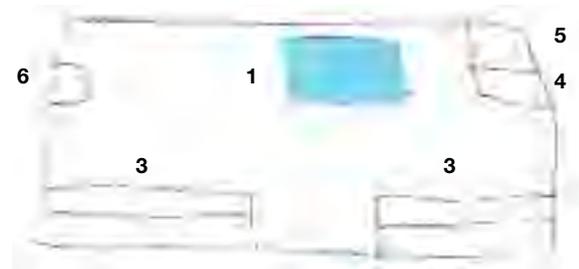
### Tea cartoons

In 1970, a settlement grew up to the back and east of Deira, appropriately named Carton, as it was made entirely from tea cartons, although the roofs and fences were of palm leaves and daan mats.

Plan of a typical Dubai house



Al Suwaidi household in Jumeirah<sup>23</sup>



- 1 Arish (summer house)
- 2 Wind tower
- 3 Khaimah (winter house)
- 4 Kitchen
- 5 Bathroom
- 6 Entry



Except for the masonry buildings, palm trunks, chandel and murabba hardwoods formed the structural support for these settlements.

### **Palm-leaf use today – heritage villages**

The phenomenon of the ‘heritage village’ exists in Dubai, as well as in Sharjah. Thanks to the economic boom that preceded the economic crisis in 2008, the Shindagha area beside the creek, the Bastakya and some historic buildings in Deira were preserved, but they are now the only places where the traditional architecture of Dubai can be seen today.

Palm-leaf use is limited to a few structures in the heritage village, Bastakya, and one-off examples, for example in the Coffee Shop in Jumeirah Majlis and at Ras Al Khor Wildlife Sanctuary.

The restoration and conservation of old Dubai can be attributed to the initiative and dedication of one man, the architect Rashad Mohammed Bukhash, Director of the General Projects Department of Dubai Municipality. The pressing question remains, however – how to take this reconstructed heritage outside the walls of the heritage village into the heart of the city and give it authenticity in visual interpretations.

[top] Reconstruction of a typical Dubai house. Dubai Museum, March 2010

[below] Majlis Ghorfat Um Al Sheef, Jumeirah, April 2010





3

# Design Details

In 2010, BBC Radio 4, in partnership with the British Museum, broadcast a series of programmes entitled *A History of the World in 100 Objects*, each inspired by and describing the significance of an artefact from the museum. Similarly, the history of palm-leaf use in the United Arab Emirates is in essence a history of the nation and, by tracing the story of its applications through the centuries, it is possible to identify patterns of human habitation in the country.

The story of the palm leaf is not only a sequence of historical events but also a tribute to human inventiveness. There are endless examples of splendidly imaginative and ingenious ways in which palm leaf has been used, testifying to the fact that people can construct buildings without architects and that centuries of knowledge embedded in their societies enable them to do it well, simply by responding to the climate. These builders have a profound understanding of the material: how, for example, retaining the small leaves on the palm frond provides cooling; how to join these leaves, locally called khus, with a rope; and how to create an endless range of patterns with just a palm frond and a rope. Even the most expert climatologist could not improve upon the

simple yet brilliant devices that allow the external envelope of a house to breathe and still permit internal air circulation; the different methods of constructing walls from widely positioned palm fronds with gaps in between to allow the breeze to enter (such as Arish Cayady in Ras Al Khaimah); the practice of leaving a gap between the top of the walls and the roof to permit wind penetration in coastal areas (such as Ajman); or the extraordinary wind towers of Dubai and Sharjah. Arish interiors are simple and beautiful, created from a perfect combination of palm fronds, rope, sunlight and human imagination.<sup>24</sup>

# Liwa

Details of a palm-leaf house,  
unique to the Liwa region





# Al Ain



Details from Al Ain Oasis houses

[this page] Traditional daan mats woven at the Sanaiya by ADACH Conservation Staff

[opposite] Arish structural elements, in the Al Ain National Museum







Structure at Al Ain Oasis

[opposite] Detail of fence  
at Hili Oasis

# Hatta

[below] Hatta Old Village  
window detail

[opposite, top left] Interior  
of the Arish enclosure

[opposite, top right and  
below] Hatta styles: kuse,  
barasti and sarabic





# Fujairah



Details from Fujairah heritage village and the external majlis in Safad village



East Coast



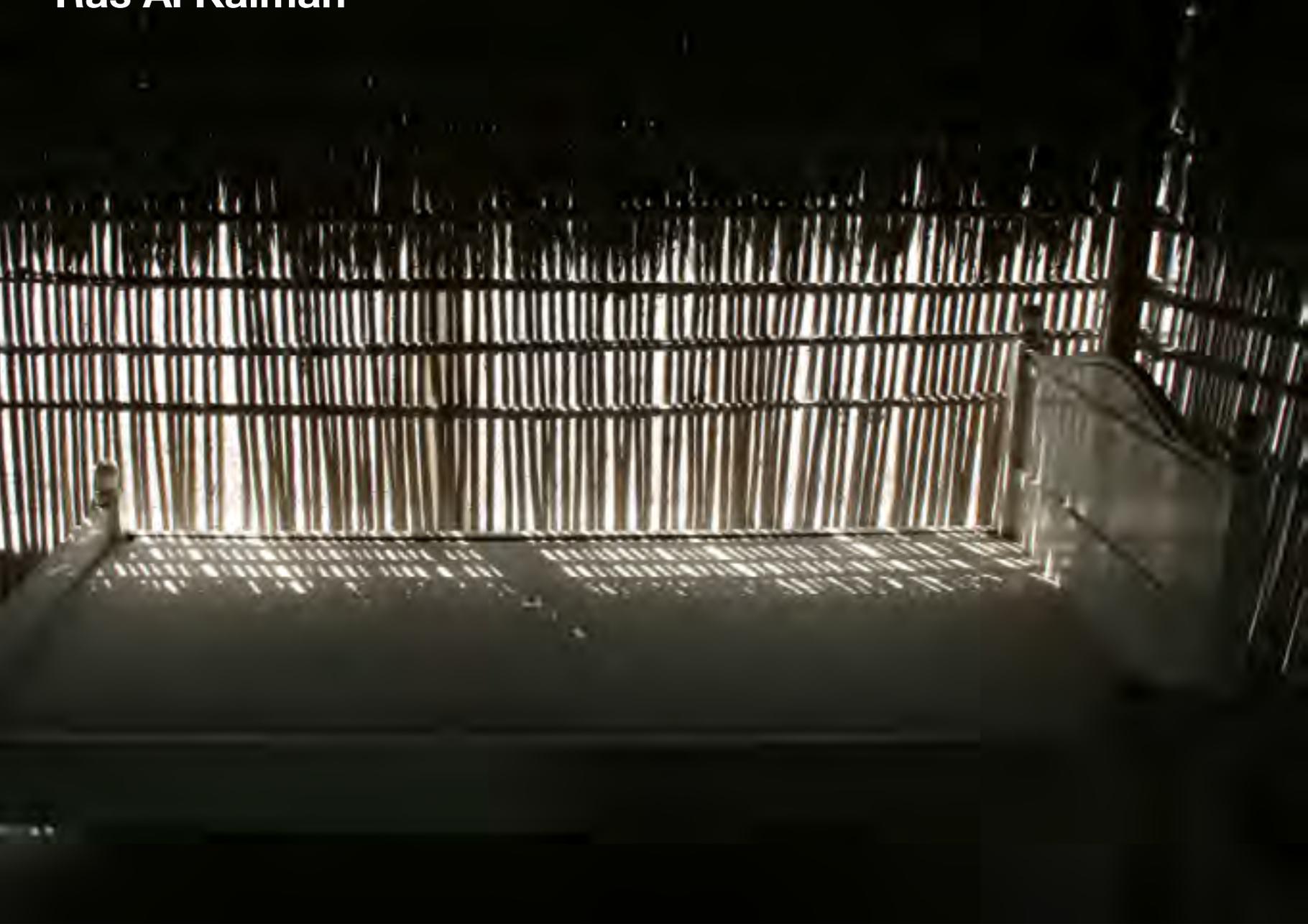


[opposite and above] Details of coastal architecture in Khor Kalba

[left] Fishing village in Dibba



# Ras Al Kaimah



Arish Mogassas and Arish  
Cayady details, unique to  
the Ras Al Khaimah region



# Umm Al Quwain





**[above and opposite top]  
Interior of a reconstructed  
Arish in Umm Al Quwain  
Museum**

**[opposite below] One of  
the very few authentic Arish  
structures remaining in Falaj  
Al Mualla**

Ajman





**Details of Arish in Ajman.  
Typical slot (50 cm gap)  
for air intake covered  
traditionally with sailing  
canvas**

Sharjah

Sharjah heritage village area,  
with Al Hisn Fort (this page)



Dubai





Reconstructed wind tower  
and detail of palm-leaf  
enclosure from Shindagha  
area



Details from a typical Arish house in Dubai, reconstructed in Dubai Museum





Two reconstructions of wind towers, one carried out in a traditional way with linen made from recycled rice bags and the other a contemporary interpretation of a wind tower in the Majlis Ghorfat Um Al Sheef, Jumeirah





4

# Contemporary Applications

**An Arish arch; the first of  
a series of tests attempting  
to evaluate structural  
properties of palm leaves,  
August 2009**

In the age of ‘copy and paste’ solutions, what should modern architecture be? What should be its *raison d’être* and its aspirations? Should we erase history? Demolish buildings after 25 years and keep repeating the same building typology in London, Doha and Kuala Lumpur? In the midst of these possibilities, paradigms of indigenous architecture offer alternatives.

Vernacular buildings have responded to climate and landscape for thousands of years. Indeed, they both offer the best lessons for passive (not mechanical) environmental sustainability and position architecture in the cultural context.

Imitating the past is not necessarily the best way of finding an appropriate architectural language in which to express authentic cultural continuity. How, then, to connect to the past, the land and the indigenous people?

In the case of palm-leaf architecture, the answer may be to find new applications for a material that is readily available. In the United Arab Emirates alone there are 42 million date palms. The challenge is to find a use for parts of the material that are redundant in traditional building. For example, dry palm leaves need to be cut from the date palm annually in order to prepare the tree for the next

year's date harvest. Yet no one has yet successfully utilized these discarded leaves in modern buildings.

The first attempts in the UAE to investigate how to use palm leaves in 21st-century architecture have been carried out by the author, in connection with a specific project commissioned by the Abu Dhabi Authority for Culture and Heritage (ADACH): the Eco-Arish Building Prototype, in Mougab, Liwa Oasis, in Abu Dhabi Emirate. The aim of the project is to provide residential accommodation for ADACH conservation staff based in Liwa.

In the absence of any technical data about the material, the only way to explore all the possibilities was to construct full-scale prototypes and test the behaviour of the material. The professional design consultants appointed to the project had to approach the subject of modern construction from palm leaves in a different way from standard or known building construction methodologies.

Prototypes have been successfully constructed to explore three aspects of building with palm leaves: structure, prefabrication and ornament.

# Structure

One palm leaf has no structural strength. A first test was to analyse the bending properties of leaves bonded together with a rope to form an arch. In order to assemble an arch, palm fronds were peeled from leaves and soaked for a night in non-saline water. Wet fronds were then connected to form an arch. Early results showed that it was critical to place the fronds regularly in order for the arch to have structural strength.

To achieve a 13 metre span with 4 metre height, the arches were propped up by palm tree columns in three places. Three such propped-up arches, along with a secondary structure, formed a strong support for a roof covering. The largest distance between arches was about 3.5 metres. A rope, made traditionally from palm tree fibres, was employed for binding, although for actual building construction it is recommended to use adjustable steel brackets.

Woven daan mats, originally the chief components of walls and roofs, represent one of the oldest techniques in palm-leaf architecture. The weaving pattern employed to connect palm fronds with a rope varied according to their region of origin. The daan mats used for the present project are quite common in Oman and used for ceiling construction in mud buildings around the country, particularly in the Al Ain area.

Several of these daan mats, with lining in between, were used to form a waterproof roof. The team estimated that one arch weighed about 500 kilograms and three arches could comfortably support a load of 2 tonnes of palm leaves. On 8 November 2009, the wind speed in Al Ain reached 35 km per hour but left the arched structure completely untouched, much to the satisfaction of the structural engineer.

The structural use of palm leaves to construct a waterproof roof covering offering excellent thermal properties is therefore a proven methodology. A roof of this kind on a building with stone walls makes for an air-conditioned place of habitation.

Collaboration between the architect, structural engineer and highly skilled craftsmen working for ADACH in the Al Ain branch was vital to the project, which could not have been realized without the dedication of Peter Sheehan, Historic Buildings Manager, and Mohamed Al Neyadi, the Director of the Department of Historical Environment, both of ADACH Al Ain branch. The assistance of Haithem Salah Ahmed Mohamed, Structural Engineer of Ramboll, has also been invaluable.



Series of tests aimed at creating a full-scale mock-up and evaluating structural capacities of palm leaves, July–November 2009. Tests were carried out by the author at ADACH's Sanaiya workshop in Al Ain with the assistance of ADACH conservation staff





**A completed enclosure with a waterproofed roof, being signed off by the structural engineer**



## Prefabrication

Historically, Arish buildings were prefabricated, not like the design components for smart steel structures that we see today, but in the sense that they were portable. The walls and roofs of palm-leaf buildings could be rolled up like a carpet and transported on a camel, donkey or dhow.

During our investigations, we carried out tests to understand whether it is possible to construct a net structure from palm fronds and a stainless steel node. The equilateral triangle, a Pythagorean triangle, was chosen as the unit for a module. When connected, equilateral triangle structures are capable of creating curved geometry, arches and large-span structures, familiar examples being geodesic domes.

The challenges experienced related to the fact that palm frond is a natural material, which comes in many variations, especially widths, making it difficult to connect palm fronds with a standardized node. Ideally, the node needs to be flexible to accommodate variations in palm-frond size and the fronds should not be drilled through or peeled at the ends, as this process can split them. Learning about the limitations of the material allowed us to conclude that flexibility of the node, connections of more than one palm frond in a unit and the sizes of the equilateral triangles are the principal elements in the construction of prefabricated palm-leaf nets.

With the structural support of murabba timber, the net structure nevertheless stood up. Woven palm fronds with small leaves directed inwards formed an effective shading device. The recommended use for this application is as a workshop or materials store, where mechanical ventilation is not required.



First attempts to evaluate a prefabricated method of construction using dry palm fronds

[opposite] The material has limitations. Architect Simi Sreedharan assisted on a specific study of the nodes





Progress from July to November 2009 on a series of mock-ups testing different components of prefabricated elements



# Ornament

Modernism brought uniformity to architecture, with the result that concrete boxes, white walls and an absence of ornament characterize contemporary designs. Globalization threatens national cultural identity. To counter this threat architects in individual countries could apply ornamental motifs based on their own cultural patterns. In his studies of the language of pattern, Christopher Alexander, an architect noted for his theories about design, has proven that there is a link between patterns and human memories. Therefore, pattern language based on ornament does indeed contribute to the preservation of cultural memory.

In order to find an authentic pattern for the Liwa area, I decided to create ornamentation by casting gypsum panels for the elevations with impressed elements of the palm tree. I carried out tests to determine the biggest size of gypsum panel that could be cast without any reinforcement. A mock-up panel, 90 cm long by 40 cm wide and 7 cm deep, with imprinted palm-leaf motif, was cast successfully. The possibilities for creating authentic ornamental panels from gypsum and palm leaves, both for external elevations and interiors, are infinite. The current proposal is to use large gypsum panels on the external elevations of the planned building. Traditionally, Iranian masons used gypsum panels as screens in their buildings in Iran, Qatar and the United Arab Emirates.



Tests carried out to check whether it is possible to create a pattern using gypsum and a dry palm leaf

[opposite below left] Mohammed Saleh Ali Noor, an extraordinary Arish master who has been working in Al Ain for almost thirty years. Mr Saleh's participation in the tests was indispensable





**Cast gypsum panels, July  
2009**

**[above] With retained palm  
leaves**

**[opposite] With impressed  
palm frond**







5

# Resources



## Step-by-step Arish

For thousands of years architecture has been created without architects. In the case of palm-leaf architecture, buildings were created by a family or entire neighbourhood. It was a local affair. Children were taught by parents how to construct Arish buildings and participated in the construction process in a way appropriate for their age. Usually at least four people were needed to weave a daan mat. The raw material was readily available after completion of the date harvest, from October onwards.



[opposite] A rope, an essential component for weaving Arish fronds. Traditionally made from palm tree trunk fibres

[this page] Daan mats without leaves, made by ADACH conservation staff in Al Ain

Construction of a traditional building involved the following steps:

- 1 Cutting dry palm fronds from the tree in the oasis
- 2 Transporting palm fronds to the site or a place of fabrication.
- 3 Preparing palm fronds (this can also happen in the oasis):
  - Trimming curved ends
  - Peeling palm frond from leaves if required



- Shaping cut ends of the frond to similar sizes. In Al Ain or Oman, daan mats are made by a different technique than in Liwa for instance. (Al Ain: see p. 186; Liwa: see p. 187)

- 4 Soaking palm fronds in non-saline water for a night. In the desert areas such as Liwa, palm fronds were placed in the sand to make them soft



- 5 Weaving daan mats from rope and prepared palm fronds. This is a job for at least four people.
- 6 Preparing the structural frame (primary structure), usually palm trunks or any other timber available
- 7 Roof covering



- 8 Constructing double-layered walls. In the Liwa area, hassir mats were placed between the walls to prevent sand from penetrating to the interior
- 9 Installing doors and accessories  
Palm-leaf buildings were constructed without drawings, nails or legal contracts.



# Afterword

*Civilizations collapse when the people lose their creativity.*  
Arnold Toynbee, *A Study of History* (1934–61)

Change is constant. Recent technological advances are changing the way we work, think and communicate with each other. Things tend to happen instantly and we need only press a button in order to book an air ticket or buy goods. However, cultures and civilizations develop through centuries. Though the past may be out of fashion and heritage heroes are rarely discussed on social networking sites, it behoves us to preserve indigenous cultures, not contribute to their extinction.

We do not know to what extent economic growth impacts on indigenous cultures worldwide. In countries that have experienced rapid economic growth, such as the United Arab Emirates, the concept of indigenous culture may need to be recontextualized, not only in terms of adapting the past to modern lifestyles but also in order to communicate this indigenous culture to the national and international community.

Contextualization of the indigenous culture may be considered on two levels. One is within the culture itself and the other is from the perspective of an international community that is capable of constructing cities in developing countries. For the gods of globalization, the chance to construct cities and other developments quickly may be viewed as a brilliant spur to economic growth. However, in the absence of mechanisms that will preserve and promote indigenous cultures, many international architects tend to construct replicas of buildings from their own countries, regardless of fundamental differences between climatic zones, social structures and religion. Could this contribute to the extinction of indigenous cultures? Yes. Surely, then, there is a moral obligation on architects to think more deeply about what we are constructing. How will it impact societies in ten or twenty years' time? To their benefit or their long-term disadvantage? Buildings reminiscent of dunes or shaped like falcon wings are profoundly disconnected from seven thousand years of history. The international architectural community has a duty to make the effort to access and connect with local cultures in a better way.

New ways of ensuring the continuance of crafts need to be found too. People have been building for thousands of years without architects, drawings or models. They know how to do it, and we must respect and retain their skills by developing construction projects that encourage collaboration and enable craftsmen and artisans to contribute meaningfully to them wherever practicable.

Support for heritage is changing at local level too. Social customs maintain aspects of intangible cultural heritage. Palm-leaf heritage is partly tangible, because people lived in real houses, and partly intangible, in that it encompasses crafts, traditions and skills passed from one generation to the next without external input. Today the government plays an important role in the preservation of the UAE's heritage. However, the process of automatic transfer of skills is gone: parents no longer teach children the Arish craft, partly because families live in conventional modern houses and children spend their days in school.

My observations and interviews show that those who still have Arish craft skills are aged between 50 and 70 years. So, in order to prevent this ancient craft from vanishing, I suggest the following measures.

**Communication ('Arish PR'):** Communicating the existence of palm-leaf architecture to the local and international community as widely as possible, by means of publications, exhibitions, symposia and lectures, including publishing accounts of projects that have explored the use of palm leaves in

contemporary architecture, such as the Eco-Arish Building Prototype project.

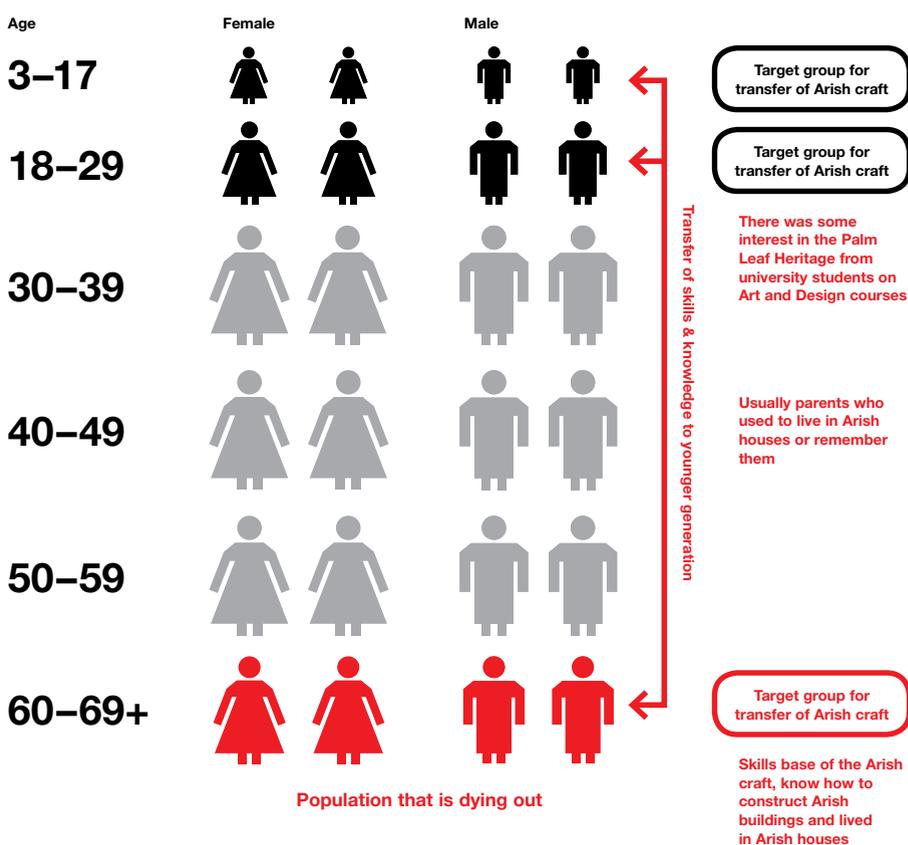
**Education:** Transfer of skills from one generation to the next, by introducing palm-leaf building and other craft courses into the curriculum of national schools at all levels.

**Community-led initiatives:** If you inspire a mother, it is said, you inspire the entire community. Small, community-led initiatives related to the preservation of the cultural heritage often bring about the revival of a craft that policies cannot achieve.

**Research and development:** Setting up a research centre to explore all aspects of date palm-leaf use in building construction and explore its endless possibilities in the product design and construction industry in general.

### Status of Palm Leaf Heritage in the UAE.

Age groups representing practical knowledge of the Arish Heritage. This is an informal analysis based on interviews related to the Arish Heritage and carried out throughout the 2009–2010 in the UAE.



**Crafts:** Support and expansion of the existing craft base while at the same time resisting conflicting influences from foreign sources.

**Legislation:** Implementation of legislation and regulations in planning and building.

**Validation of indigenous cultures at global level:** Encouraging people from all over the world to appreciate and value their precious, unique cultures.

If we do not act quickly, along the lines of these recommendations, we may suffer the total extinction of Arish, which is at present dying out as its expert practitioners age. There is not much time left to prevent this tragedy.

## Note on transliteration

Arabic words used in the text have been spelled in English, even though they are of Arabic origin and some have no equivalent in the English language. Below is an explanation of the phonetics of some of these Arabic words, provided by Classical Arabic teacher Shaima Mahmoud Awad.

### PRONUNCIATION

Most Arabic sounds are the same as English sounds; only a few have no English equivalent.

As they are pronounced from the throat, some of these sounds (such as h', kh, a' and gh) are called 'throat letters'. They can be divided into three parts:

1. Near throat: near to the tongue: (gh, kh)
2. Middle throat (a', h')
3. Far throat: away from the tongue but near to the chest

The remaining letters are a tough version of the following sounds: s, d, t, dh, and k. We will refer to them as: S, D, T, DH, and Q. Those tough sounds are pronounced with tight round lips.

**Arish:** the first sound comes from middle throat.

**Khaimah:** the first sound comes from near throat.

**Daan mat:** the sound D is pronounced toughly with tight round lips.

**Hassir:** the sound H is pronounced from middle throat.

**Manamh:** the sound 'h' at the end of the word is not a real 'h'. It is not considered as a main letter in the Arabic alphabet but rather as a special character. It is called taa marbooTa and comes only at the end of feminine Arabic words. It is pronounced as 'h' and in some cases as 't', so the word could be 'Manamh' or 'Manamat'.

**Arish Mogassas:** the sound 'g' does not exist in Arabic, but it is used in some Arabic dialects as referring to the standard Q sound.

**Arish Cayady:** the sound C is close to k but it is pronounced more toughly from the far tongue close to the throat.

**Al Murabbaa:** the first 'Al' is the Arabic definite article that means 'the' in English.

**Khus:** the sound kh is pronounced from near throat.

### ARISH – AUTHOR'S NOTE

In the United Arab Emirates 'Arish' designates a palm-leaf summer house. Just as there are regional variations in the architecture of Arish, so the spelling of the word Arish changes from region to region. Due to the large number of these regional variations, for consistency I have chosen to spell the word Arish as 'Arish' and not 'Areesh'. It is here used as a general term referring to all palm-leaf buildings in the United Arab Emirates, in the widest possible sense.

## Notes

- [p. 12] This map is a general illustration only and does not necessarily reflect current political boundaries.
- [p. 55] This table is based on Dr Frauke Heard-Bey's book *From Trucial States to United Arab Emirates: A Society in Transition*, Dubai: Motivate Publishing, 2009. Dr Frauke Heard-Bey refers to the statistical population count from 1908 in order to provide numbers of people within the UAE tribal population. Reference: J.G. Lorimer. *Gazetteer of the Persian Gulf, Oman and Central Arabia*, vols. I (Historical) and II (Geographical and Statistical), Calcutta: Superintendent Government Printing, 1908–1915.
- [p. 56] Based on interviews with Mrs Fatma Khamis Al Fendi Al Mazrouei, Liwa Date Festival, 26 July 2009 and 2 July 2011.
- [p. 74] Information obtained from G.R.D. King, *Abu Dhabi Islands Archaeological Survey, Season 1: 1992*, London: Trident Press, 1998, p. 47; and interview with Ateega and Salama Saeed Al Mazrouei and Ahmed Ghanim Al Mazrouei, Delma, 3 November 2009.
- [p. 74] Once the dates are collected, the dry palm leaves, usually about ten in number, are cut away from the tree: these are the Arish. The branches that held the dates are also stripped of any excess material, and any degraded fibres are removed from the trunk. This 'cleaning' is done annually around October.
- [p.74] Information obtained from Ateega and Salama Saeed Al Mazrouei and Ahmed Ghanim Al Mazrouei, Delma, 3 September 2009.
- [p. 76] Lorimer, *Gazetteer* is a reliable source of demographic information. The work is frequently cited in Heard-Bey, *From Trucial States*.
- [p. 78] Based on an interview with Hassna Al Hemadi, 2 November 2009.
- [p. 84] Frances LaBonte, *The Arabian Date Palm*. Dubai: Jerboa Books, 2006, p. 19.
- [p. 93] All information about Bitnah village obtained from interviews with Rashid Al Yamahi and his sisters Saleimah and Bashayer Hefaiti, 21 September 2009.

- [p. 104] Information obtained from the Government of Ras Al Khaimah, Department of Antiquities and Museums.
- [p. 104] Information about Al Zaabi tribe obtained from an interview with Mr I. Al Zaabi, 11 October 2009.
- [p. 104] Based on information supplied by Manal Al Suroomi, Shimal, 6 October 2009.
- [p. 110] All maps, diagrams and text based on an interview with Alayaa Mohamed Al Ghafly, Director of the Umm Al Quwain Museum, 8 October 2009.
- [p.112] Information for this section comes from *The Fortress: History and Heritage*, Ajman: Ajman Museum, 1998, p. 14, and other documents held in the Ajman Museum.
- [p. 116] All maps, diagrams and text based on an interview with Mr Ibrahim Mohamed Salem Awadi, Ajman Museum, 26 October 2009, with acknowledgments to the translator, Dr Salma Kouraichi.
- [p. 116] Based on information supplied by Mr Ibrahim Awadi.
- [p. 120] See *Archaeological Surveys in Sharjah Emirate: First Report*, Sharjah: Directorate of Archaeology, Department of Culture and Information, 1983.
- [p.121] The author would like to acknowledge the assistance of Eisa Abbas Hussein Yousif, Supervisor of Archaeological Survey and Excavations at Meiha site, from the Directorate of Antiquities of Sharjah Government, Department of Culture and Information.
- [p.124] This chapter is based on interviews with Mrs Salma Rashed Al Mskary, Mr Khalifa Mubarak Al Rufaisa Al Katbe and Mr Abdulaziz Abdulrahman Al Musallam, Sharjah Director of Heritage and Cultural Affairs.
- [p.126] Heard-Bey, *From Trucial States*, chapter seven ('Dubai—Example of a City State on the Trucial Coast'), section one ('Dubai before the 1950s').
- [p. 126] Personal email to the author, 13 May 2010.
- [p. 130] Drawing by Aisha Yasife Al Suwaidi, 23 March 2010.
- [p. 137] The photographs in this section were taken in the years 2004–2011.

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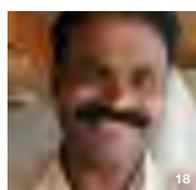
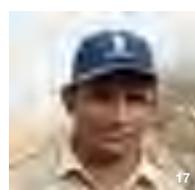
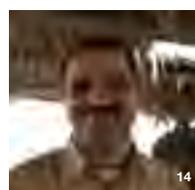
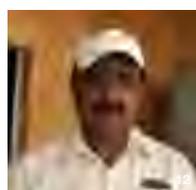
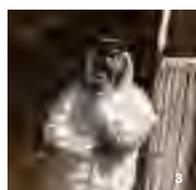
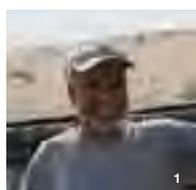
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