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To cite this article: Nader Ardalan (2022) Persian Gulf cosmopolitan cities: past to present, International Journal of Environmental Studies, 79:2, 187-212, DOI: [10.1080/00207233.2022.2031306](https://doi.org/10.1080/00207233.2022.2031306)

To link to this article: <https://doi.org/10.1080/00207233.2022.2031306>



Published online: 01 Mar 2022.



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Persian Gulf cosmopolitan cities: past to present

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ABSTRACT

The survey of urban development in Bushehr and Bandar Abbas raises questions of long-term sustainability of the region's urban environment and the wellbeing of its inhabitants. The paper considers the general issues of environment/ public health in a socio-economic and cultural context, and with attention to urban form and architecture.

KEYWORDS

Persian Gulf; urban culture; architecture; sustainability

Introduction

Architecture and city building in the hot, semi-arid and humid Persian Gulf Region has a continuous history of more than 7,000 years, from at least the late Neolithic Period to the Ubaid Culture (4500–3500 B.C.); to the later urban, literate world of the Sumerians (3000–2000 B.C.) and Elamites (.2400 – 1400 B.C.) and continuing to the ensuing Islamic period to date [1]. This paper focuses on observations of the key common ground characteristics shared by the eight countries surrounding this Gulf region and discusses two Persian cities: Bushehr and Bandar Abbas located on the Southwestern coastline of Iran on the Persian Gulf (Figure 1). Bushehr has always been the most important Iranian port on the northern portion of the Persian Gulf. Bandar Abbas was chosen both for its history and its present importance as the largest and most southern Iranian port on the Straits of Hormuz. These Persian cities, including the old city of Bandar Lengeh, influenced the architecture and building technology of such settlements on the Arabian Peninsula as Bastakiya in Dubai and Muharraaq in Bahrain [1]. In these desert regions of highest solar radiant energy gain, minimum potable water availability and scarce material resources, how were civilisations able to support human life and sustain an interrelated, cosmopolitan maritime culture?

Research methodology

The perspective for viewing these matters is derived from a Harvard University research group and from related other academic work for assessing the urban sustainability of the Persian Gulf [1]. The framework was woven from concerns about environment/ public health in a socio-economic and cultural context, and with attention to urban form and architecture.

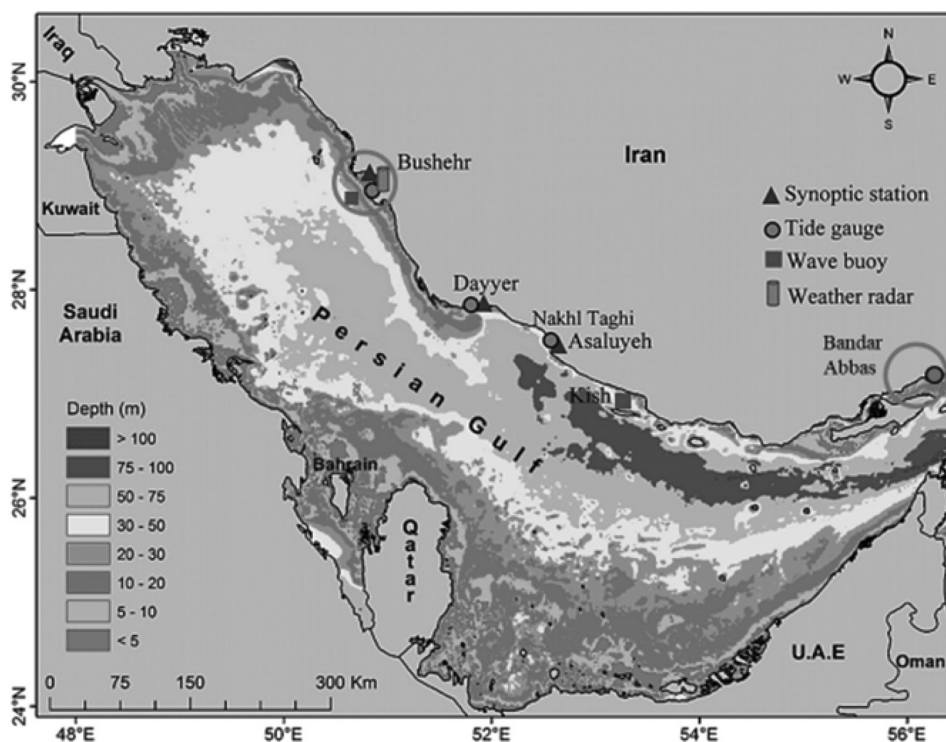


Figure 1. The Persian Gulf bathymetry with circles showing the city locations of Bushehr on the north and Bandar Abbas on the southeast.

Environment

The Persian Gulf cities in this study share many similarities in terms of climate. Extremely high temperatures and humidity, high solar radiation levels and very low precipitation are common across the area. Yet there is considerable spatial variation in climatic features owing to the geomorphology of the Gulf coastline. The climate conditions have become more severe over the past century as a result of global climate change, with an increase in temperature of approximately 0.5 degrees Celsius across the year and a 1 degree C increase in the summer months. Although Islamic practices of personal hygiene have played a significant role in disease prevention, infectious diseases were the main health problem in the coastal cities, but with low chronic disease rates until the 20th C.

Economy: mutual dependency

Prior to the 1950s, the inter-related maritime trade of agricultural goods and potable water between Persian Gulf cities kept them economically interdependent, and the major Dhow owners maintained international trade between the Gulf Region, India, and the African East Coast. The principle regional maritime economic activity related to fishing and pearling, with the major pearl beds being situated along the shallow coastline of Bahrain, Doha and Abu Dhabi with the pearling season

extending from May to August [2]. Pearls were mainly exported prior to the 19th century through Bandar Lengeh to India and the Far East. Coastal settlements of the Arabian coast which lacked potable water relied partly on provision of 'sweet water' and agricultural products brought by dhows from the Iranian coastal cities. Roof mangrove poles (chandal) were imported from Zanzibar and teak wooden doors and windows from India. Most urban economic activities took place in the Suq. Today, self-sufficiency has become consumerism.

Society and culture: self-sufficiency/flexibility

The Gulf has probably always been ethnically mixed. Arabs were predominant on the Arabian littoral and parts of the Iranian shore (especially in the eighteenth and nineteenth centuries) and Persians were present in significant numbers on both sides. In the 19th C transnational merchants dominated the socio-economic life of the Persian Gulf, connecting Persia to eastern Arabia by trade. Many other tribal or communal groups made up the picture, including Indian traders, Baluch labourers, Hawala merchants and African slaves.

There was also a history of insecurity for Persian Gulf city inhabitants, including public health concerns and incursions by pirates, Bedouins, and other invaders from the region and foreign lands. These risks encouraged the introverted, walled city and the courtyard house with minimum external openings.

Islamic belief systems emphasised the individual's role as a steward of nature and encouraged urban life over nomadism – leading to spatial and social proximities. The key Qu'ranic concept of Batin/Zahir (Inner/Outer) established the private life of the individual and the family, and influenced the introverted neighbourhoods, the courtyard homes and personal privacy customs.

Urbanism and architecture

The ancient monumental cities and architecture of the great civilisations of the Persian Gulf region set urban paradigms, as demonstrated by the great Sumerian Ziggurat Complex of Ur in Southern Mesopotamia built in 2,100 BC and the Elamite complex at Choga Zambil in Southwestern Iran built about 1250 BC (Figure 2) [1].

Courtyard house paradigm

An enduring architectural form throughout the region was the courtyard house. In the 1920s Sir Leonard Woolley discovered in his Mesopotamian excavations in Ur, a cluster of town houses dating from 2,000 BC [3]. These had a square ground plan with central courtyards, often containing a well within the courtyard to collect rain water; rooms were on the four sides of the square (Figure 3).

The architectural language has reflected climatic adaptive strategies with geometrical structures that minimised external surface with maximum internal volumes, with varying ventilation. Close-packed cellular structures, square in plan with cubic volumes, are an efficient response to nature.

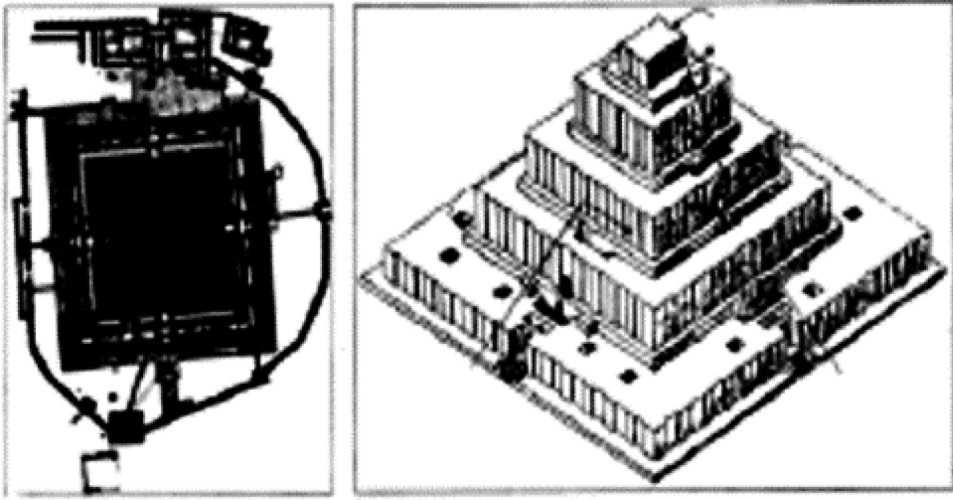


Figure 2. Elamite Ziggurat, Choga Zanbil, 1250 BC.

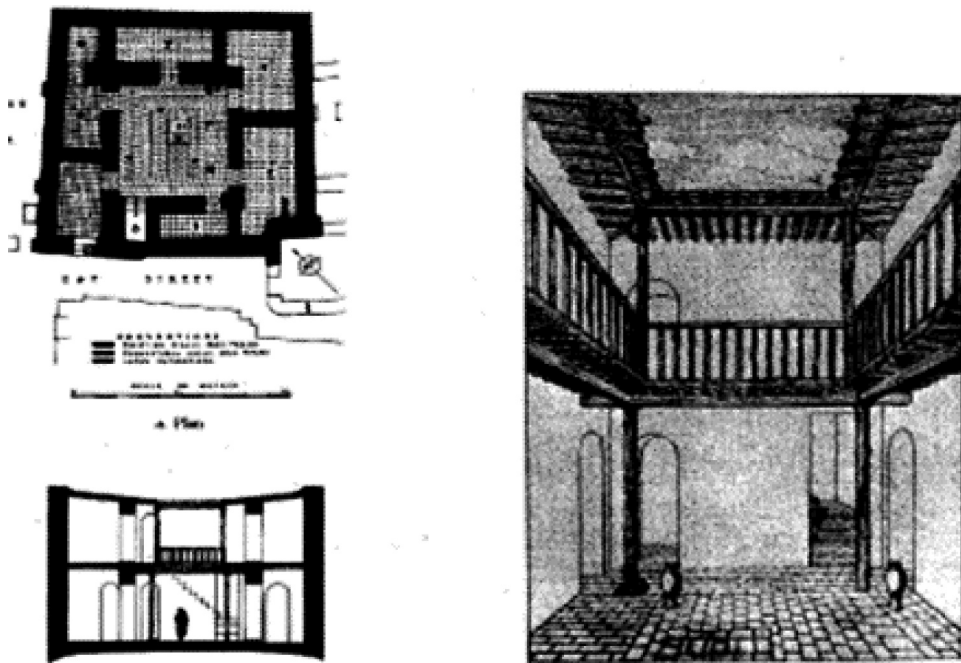


Figure 3. Courtyard houses, Ur, 2,000 BC.

The city of Bushehr

Bushehr lies in a vast plain running along the coastal region on the Persian Gulf coast of southwestern Iran. The port of Bushehr has a strategic location, both commercially and militarily. The city is built out into the Persian Gulf on

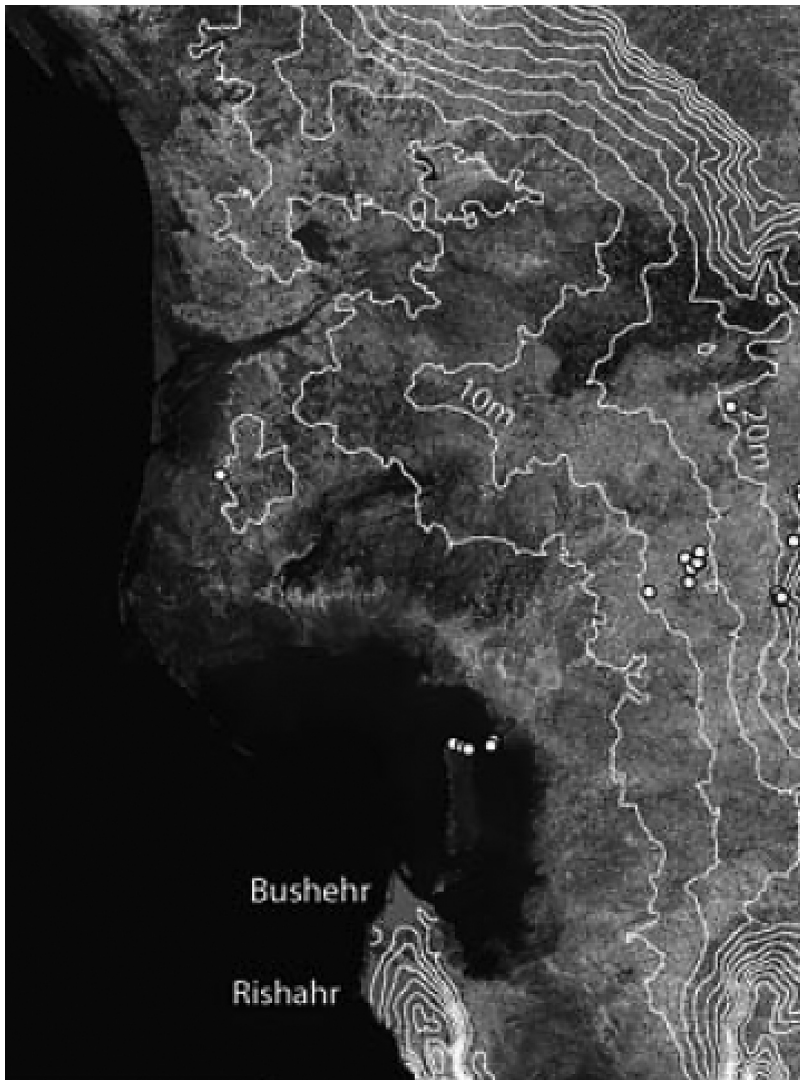


Figure 4. Bushehr city location.

a peninsula, providing natural protection for ships and boats in its harbour. The Shāpūr River drains the region and serves as an inland waterway from the coast of the Persian Gulf to Bushehr (Figures 4–5).

The past

This historic region dates back to the Elamite era, when Bushehr was known as Lian. The 2004 Iranian-British Archaeological Survey of Bushehr Province revealed a rich archaeological heritage in the Bushehr hinterland, going back at least to the Chalcolithic period., the Bronze Age and the Elamite periods [4]. In the Sasanian period there was probably a good relationship of scale between urban settlements on the Bushehr peninsula and the ancient major Sasanian port of Rishahr/Rev Ardishir



Figure 5. Bushehr old city, 1925.

to the inland Sasanian cities in Fars of Bishapur, Firuzabad and Istakhr. The Zoroastrian culture in the Bushehr area was significant [4]. After the Islamic conquest, 7th C., the Bushehr area declined in importance and Siraf became the important northern port of Iran.

Bushehr has long been an export point for farm products from the inland Fars Province. It has also served as a desirable location for foreign companies and consulates, including Britain, Germany, Russia, and the Ottoman Empire. The Portuguese invaded the city in 1506 [5]. In the mid-18th C, Nader Shah Afshar exerted great, though fruitless, efforts to turn Bushehr into an important Iranian naval base [6]. The decisive factor was, however, the shift of the centre of power in Iran to Shiraz, to which Bushehr was much closer than Bandar Abbas. In the reign of Karīm Khan Zand, Bushehr became the leading commercial port of Iran (ca. 1760–1915) [6].

By the end of the 18th C, the British and Dutch had transferred their regional commercial offices to Bushehr [7]. By the 19th C, the East India Company had established a factory there [8] abandoning Bandar Abbas. Bushehr became prominent as a base for the Royal Navy and the Consulate General of Britain governed Bushehr for 20 years [9].

The dominant role that Britain played in the city is evident in the splendid architecture of the Old Quarters of the city [10]. After World War II, in 1947, Bushehr lost its position as Persian Gulf headquarters for the British [11]. Between 1963 and 1974, the harbour capacity was enlarged from 70,000 to 200,000 tons a year, including access for ships of 7,500-ton capacity [6]. At the beginning of the 1970s a modern highway linking Bushehr to Shiraz was completed, ensuring communications with the interior [6].

The old quarters of Bushehr city

The old quarter of Bushehr was built from 1810 next to the port. It is one of the rarest types of coastal architecture in the Persian Gulf Region [12]. Besides its archaeological relics and historical monuments, there is a high standard of 19th C architecture and urban design in the city. The Old Quarter of Bushehr has been well supported and a regeneration scheme has been developed by the Ministry of Housing and Urban Development (HUD) (Figure 6).

The core of this traditional city has four districts, viz., Behbahani, Shanbodi, Kooti and Dehdashti [13]. Each of these districts had its own special mosque, square, school, bathhouse and water-storage building. The residents had a sense of belonging to their district and they would react to the issues which were related to them, in such a way that during different rituals and ceremonies no one from one district would participate in the ceremonies of a mosque that belonged to another district. Moreover, although people in every district had different ethnicities (Lor, Kazerooni, Arab, etc.) they achieved a peaceful coexistence with each other [13].

The close packing of high courtyard buildings built of thick coral walls, surrounded by shaded narrow alley ways, produced a sustainable adaption to the intense radiant energy of the region. This urban form took maximum advantage of cooling natural breezes either from the Gulf waters or seasonal wind patterns that penetrated into the courtyard houses and their surrounding high ceiling rooms [12]. These passive strategies reduced the temperature inside the shaded courtyards to be at least 10 degree C. cooler than the sunlit exterior spaces.



Figure 6. Regeneration scheme for the old quarter of Bushehr.



Figure 7. Old bazaar plan in old quarter.



Figure 8. Interior of the old bazaar, Bushehr.

The Old Bazaar, located in the old texture of the old city, is a relic of the Qajar era (1785–1925) [13]. The Bazaar consists of a typical linear Iranian vaulted pathway built in traditional brick along which 250 shops are situated on both sides (Figures 7 and 8).

Residential architecture

The vernacular architecture of Bushehr's Old City was characterised by a ground floor composed of narrow tall rooms around a shaded interior courtyard cooled by the deep shadows cast by surrounding high wall and penetrating cooling air circulation. These ground floor rooms were relegated to the gateway entrance leading directly to Men's

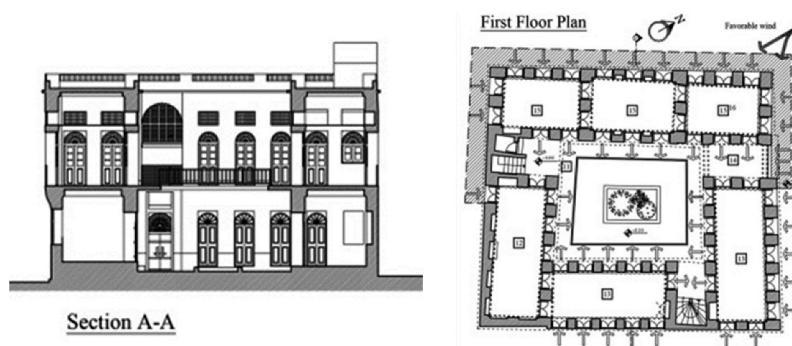


Figures 9-10. Taheri mansion exterior & interior courtyard views.

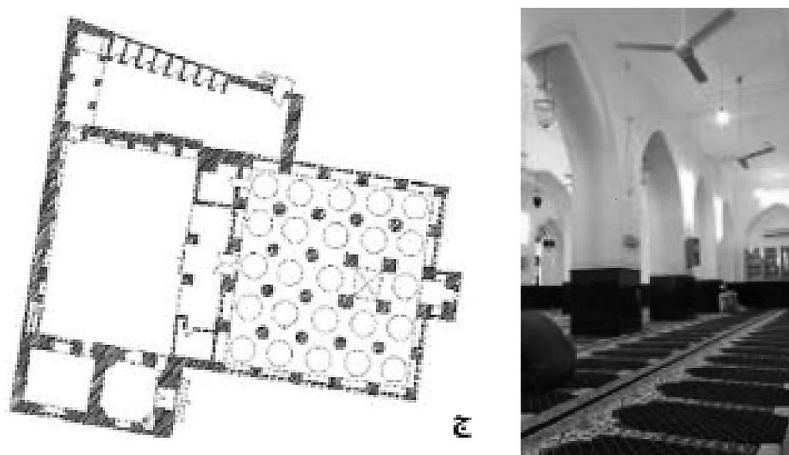
reception spaces and the central courtyard around which were the storage rooms of the merchant owners, kitchen, servant quarters, support spaces and stairs leading to the first floor family spaces. Some of these upper floor spaces surrounded the central courtyard contained wooden galleries (*Shenashir and Tarmah*) that served as an intermediate layer of shading between the exterior and the rooms, and others provided courtyard circulation and the rooms [12]. Narrow, tall arched doorways with decorative coloured glass panes or wooded screens filtered out the penetrating radiant energy of the sunlight. The tall rooms were made of coral blocks surfaced in gypsum and roofed by chandal wood beams brought mainly from Zanzibar. Rooftop spaces were used for evening sitting and night time sleeping during the summers. High surrounding wooden screen walls gave privacy. The typical Bushehr upper class residence was an excellent example of an adaptive, energy efficient, sustainable design paradigm.

The Taheri Mansion is a magnificent structure along the beach road to Behbahan (Figures 9–10). It is an off-white building that, like many other old houses of Bushehr, is made of coral limestones surfaced in stucco. The construction of the elaborate building began in 1317 by the order of Ahmad Khan Daryabeigi, who was the ruler of all the ports and Islands of the Persian Gulf at the time. It took two years to finish the building and it was originally the Darul Hukumat or the ruling house of Bushehr. This building kept its function as the city hall until years after the Iranian Revolution. It was converted to a Museum of Ethnography in 2000 [14]. It has been registered as an item of national cultural heritage of Iran.

The Rashidi Mansion is a 19th C. example of a Bushehr Merchant Residence characterised by a two story, cubic volume with central landscaped courtyard, well adapted to its environmental and cultural context (Figures 11–12) [12]. The old Masjid e Jame of Bushire (Figures 13–14) followed the hyperstyle hall pattern of most Persian Gulf traditional mosques.



Figures 11-12. Rashidi mansion section & plan.



Figures 13-14. The old Masjid e Jame of Bushehr shown in plan & interior view that followed the hyperstyle hall pattern of most Persian Gulf traditional mosques.

The present

The relatively low density City of Bushehr covers an area of ca 1,442 sq km and in 2018 possessed a population of 223,504, while the province of Bushehr had a population of 1,163, 400 [15]. Around 99% of Bushehr's population are Moslem and the remaining 1% are Zoroastrian, Christian and Jewish [15]. Bushehr has a large international airport and major highways connect it to Ahvaz in the northwest and to Shiraz in the east. The Shiraz-Bushehr railroad joins the city to the national railroad network. A costal road in the south connects it to the Nuclear Power Plant and the southern Iranian ports of Bandar Lengeh and Bandar Abbas.

The city is greatly compromised as it is divided by a large military base and the airport (Figure 15). To the north lies the old city, designated as the historic tourist sector while to the south is situated the industrial zone, which is considered by the current Municipality Master plan as the focus of the new city [13]. The wealthier inhabitants of the old districts of Bushehr city have migrated to the newer southern outskirts of the old city. Incoming

less affluent residents are not able to reconstruct or improve these old urban quarters. Consequently, these historic districts are decaying. Regrettably, there is also a lack of a sense of environmental adaptation or continuity of architectural identity with Bushehr's rich cultural heritage or human scale in the new developments of the city (Figure 16).

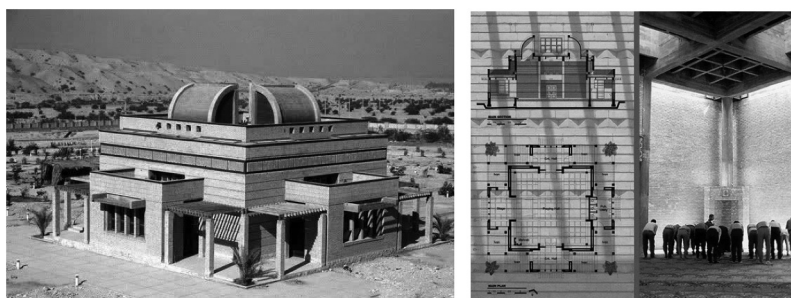
This is clearly apparent in the design of the new mosque in the Bushehr Cement Factory that was built in 2004, shown below in aerial photograph, plan/section and interior view (Figures 17–18). The plan does not follow a traditional Iranian courtyard plan, but rather an



Figure 15. Masterplan of Bushehr.



Figure 16. Aerial of Northeastern shore of Bushehr, 2008.



Figures 17-18. The Bushehr cement factory mosque built in 2004.

Iranian mausoleum form. The Mihrab placed in the Qiblah direction in a corner of the square room sits uncomfortably with the traditional Chahartaq plan. This can be seen below in the photograph of men praying diagonally towards a corner space [16].

In 1972, the Iranian Navy, building bases on the shores of the Persian Gulf, commissioned the architect Dan Eitan to design the housing accommodations for the troops and their families in three locations, Bushehr, Bandar Abbas and Kharg Island [17]. [Figures 19–20](#) show the Bushehr project. It is said that the architect saw this project as an opportunity to rectify the problems of modernism and make it more considerate of local cultural and social needs and local environmental conditions. The results are debatable as the large open courtyards, wide streets and the linear cluster of apartments make pedestrian movement more exposed to solar radiation. They are not optimum adaptive, sustainable responses to the local climate, nor to the socio-cultural patterns of Iranian life. Some of the buildings, such as mosques and the admiral's villa, were designed by Iranian architects and may have been more relevant to the culture and local climate.



Figures 19-20. Photographs of Eitan architect model & the built neighbourhood in Bushehr, 1975.

Before the Iranian Revolution, the establishment of a thermoelectric power plant to the south of the city encouraged the growth of food-processing and engineering industries nearby. These then led to such industries as dried fruits, gums, rugs, and raw cotton that are now exported. The nuclear plant and the city suffered extensive damage in the Iran-Iraq War in the 1980s, but were largely rebuilt in the 1990s [6].

Bushehr remains an important port of Iran, but has been eclipsed by the massive military, industrial and commercial investment and development of Bandar Abbas. Of course, inflationary pressures have continued to be high in Bushehr, as in other Iranian cities, in 2019/20, resurging in the first five months of 2020/21 as the Iranian rial depreciated and COVID-19 has led to a decline in employment across all sectors [18]. As a result of these pressures and irregular expansion, the massive sprawl of Bushehr does not follow the traditional urban pattern of central courtyard residences and close packing of shade giving narrow pathways. It is more based upon western standalone prototypes and thus is not a successful, passive adaptive sustainable city form (Figure 21). The city is in great need of effective urban environmental controls, particularly considering the inevitable sea rise hazards anticipated because of global heating [19]. The future wellbeing of the city depends on a better understanding of its environmental context in the Persian Gulf and the conservation of the city's historic cultural heritage.

The city of Bandar Abbas

The past

he earliest record of Bandar Abbas is during the reign of Darius the Great (between 586 and 822 BC) and Darius's naval commander, Silacus, who is said to have embarked from Bandar Abbas to India and the Red Sea. There are no records of the physical features of the city [20]. In 324 BC, it was known under the name of Hormirzad during the time of Alexander; in the 15th C as Bandar Comorao to the Portuguese; in the 17th C as Gombroon to the English traders and as Gumrun to Dutch merchants (Figure 22). In 1622 Shah Abbas defeated Portuguese troops with the help of British troops and Iranian commander Imam



Figure 21. Present urban sprawl of Bushehr.

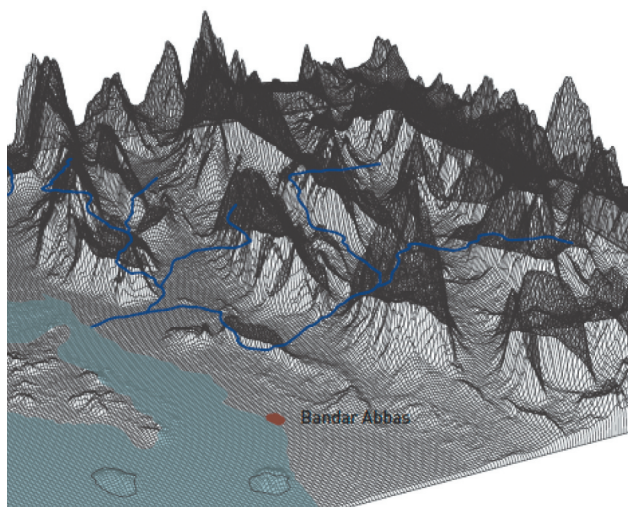


Figure 22. The geographic context of Bandar Abbas.

Qoli Khan. In honour of this victory Gombroon was renamed Bandar Abbas Port [21]. This port city, on the straits of Hormuz at the entry of the Persian Gulf, acted as a gateway for trade to and from central Asia through its direct railway link and Iran's road network [22].

The cosmopolitan culture of Bandar Abbas

Like other urban centres in the Persian Gulf, Bandar Abbas was from the outset highly cosmopolitan. In the late 16th and early 17th C, its 'older manifestation', Comorao had already come to house, according to Fr. Sao Bernardino, an amalgam of Christians, Moors and Jews [21]. In 1628, as recounted by the traveller Thomas Herbert, Bandar Abbas teemed with English, Dutch, Portuguese, Armenian, Turkish, Muscovites, Arab and Indian merchants [20]. Excluding the Armenians (who functioned as an important sub-group in the Persian economic system linking Europe to New Julfa-Isfahan with the major ports along the Indian Oceanic world) they played a significant role as middlemen after 1687 for the East India Company that maintained trading posts and colonial residences in Bandar Abbas and the Persian Gulf [21]. Between 1794 and 1868, Bandar Abbas was under the control of the Sultanate of Oman and Zanzibar through a lease agreement with the government of Iran. Residents of Bandar Abbas originally spoke Bandari, a dialect of Persian, Arabic and Baluchi with English sprinkled in [21].

The significant urban growth of the city in the 20th C started after WWII and particularly after the Islamic Revolution of 1979 (Figure 23). It has continued to develop at a rapid pace.

Urban components and neighbourhoods

By 1960, the city was organised by a fabric of neighbourhoods clustered around the city core composed of the Customs House and the harbour pier, the adjacent bazaar and the Friday Mosque. The oldest quarters (*Mahalleh*) on which there is available information date from 1922 (Figure 24). The neighbourhoods included the bazaar zone and neighbourhoods named, Siya ha, Miyan Shahr, Ghaleh Shahi, Kargozaran, Post Shahr, Oziha, Sar Rig, and Lariha [1]. Most wealthy residents lived in this zone. After

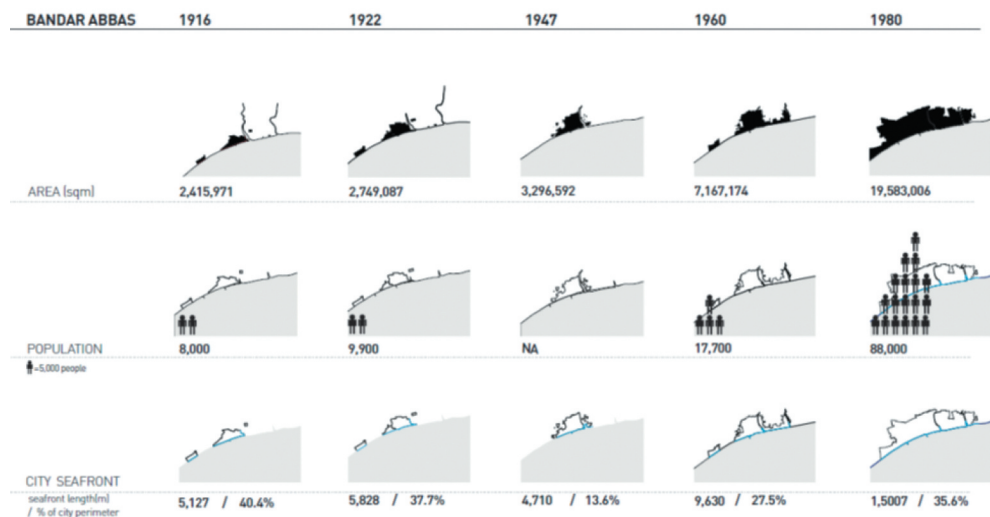


Figure 23. Growth of Bandar Abbas 1916–1980.

WWII, the newer neighbourhoods, such as the Balooch Ha Mahalleh, developed to the north and east of the old town. Outside of this city core, but older, was the village of Suru, located to the south east of the city from where Bandar Abbas originated. Somewhat later, the nearby Amirabad Mahalleh was developed, where was located the Palace in which Reza Shah was quartered after his abdication. Figures 24–30 show four traditional architectural elements (typical neighbourhood, courtyard house, mosque and bathhouse) [1].

The Balooch Ha Mahalleh (Figure 25) is a typical neighbourhood from the 1947 to 1972 period when the flood plain surrounding the river, characterised as the ‘Oasis’ was filled and built upon [1]. In 1960, this Mahalleh covered an area of 134,025 sq m with its edges occupied by informal commercial retail, while the interior remained primarily courtyard residential with rudimentary secondary

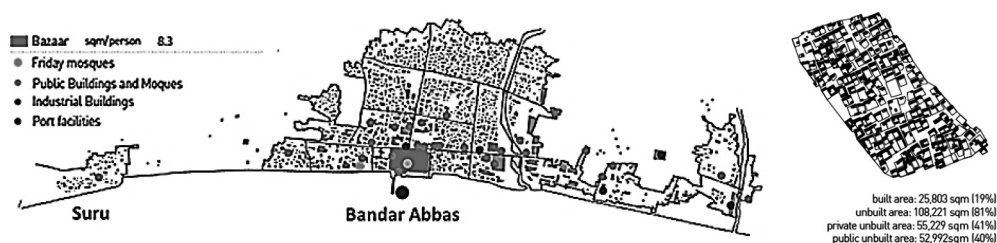


Figure 24. Plan of Suru and Bandar Abbas, showing bazaar & Balooch Ha Mahalleh, 1960.

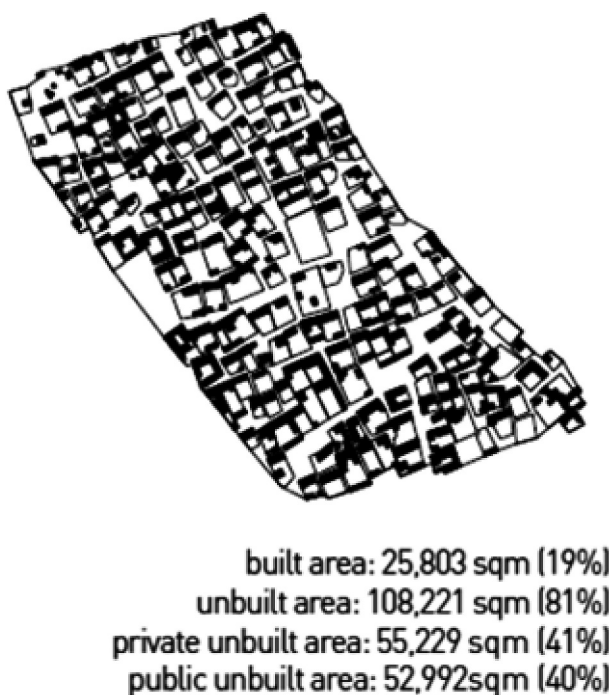


Figure 25. The Balooch Ha Mahalleh of Bandar Abbas.

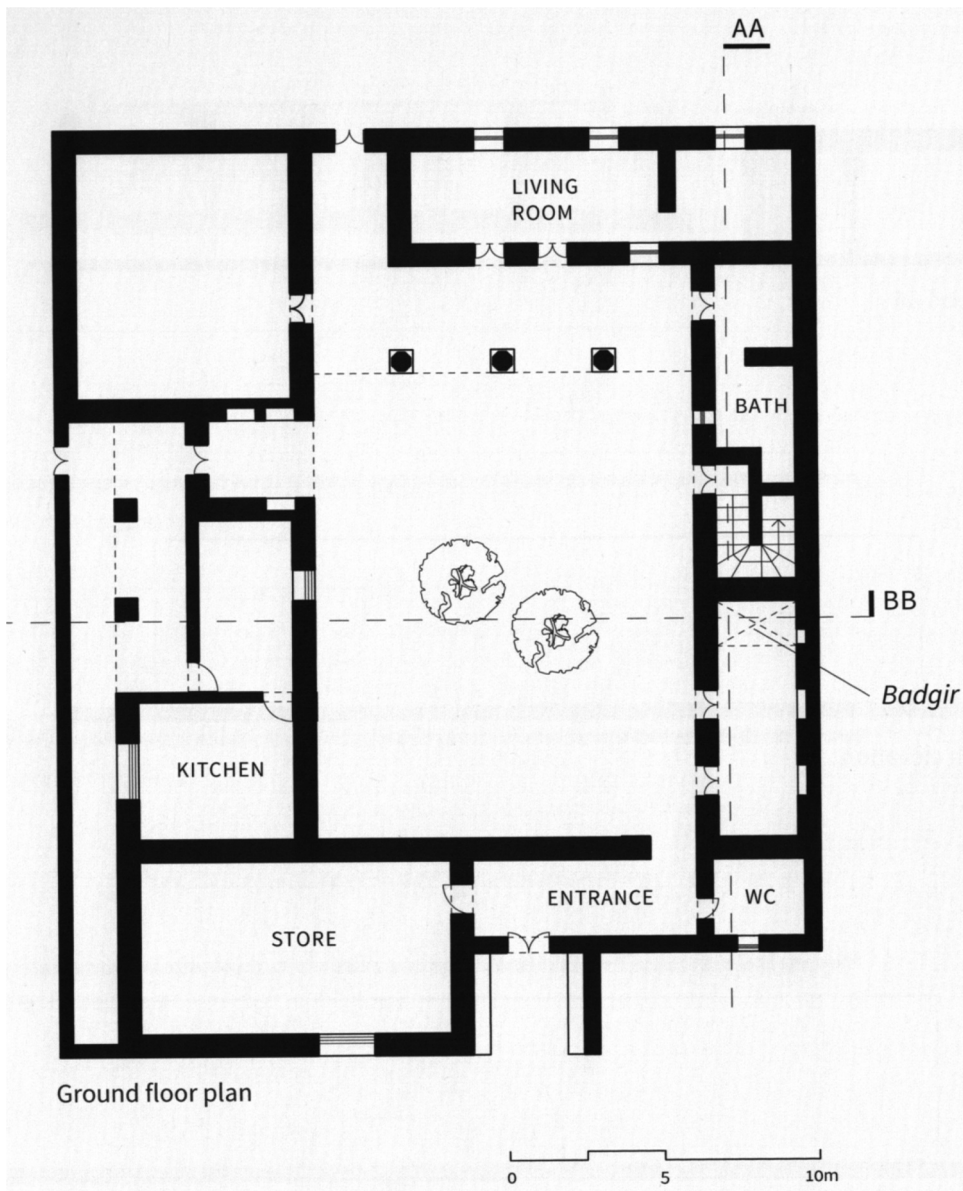


Figure 26. (a-b). Nassab House: traditional space usage plan.

roads. Building heights of its 207 plots were 98% single story, with minor two/three story units, that housed about 1,600 people. The demographics showed that the majority were recently settled, rural low-income Iranians with occupations ranging from 83% in services, 9% industrial and the rest in fishing and farming. As a result, the residents kept animals in their courtyards to meet daily needs. Thus, the Balooch Ha neighbourhood is an example of a transitional quarter of population

Open/semi-open/closed diagram

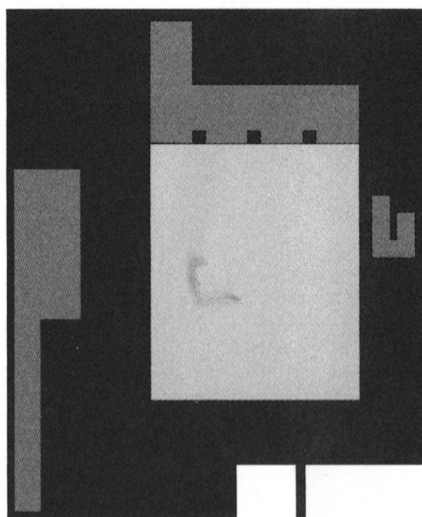
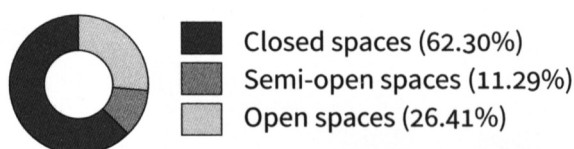


Figure 27. Space analysis.

migration pattern and expediency of adaptation to challenging new, urban environments. Its fabric lacked traditional elements such as a mosque, a school or planned recreational space for children and a sense of community cohesion [1].

Mohammad Nassab house

The Mohammad Nassab House (Figures 26–28) is the oldest house surviving in the Suru Mahalleh (Figure 24) and adjacent to Suru's Friday Mosque. Facing directly south, it catches the cooling morning breezes of the Persian Gulf waters and the cooling evening breezes from the mountains to the north by its Badgir. The house is entered through a large gateway with built-in benches (Sakoo) on either side of a wooded doorway. An entrance foyer provides access to a large men's Majlis on the left while maintaining privacy for the central garden courtyard surrounded by family rooms and porches that lie beyond. A stairway leads to the roof where the family sleeps during the summer nights. The construction is of loadbearing coral stone and mortar walls surfaced in mud plaster and covered by Chandal wood roofs [1].

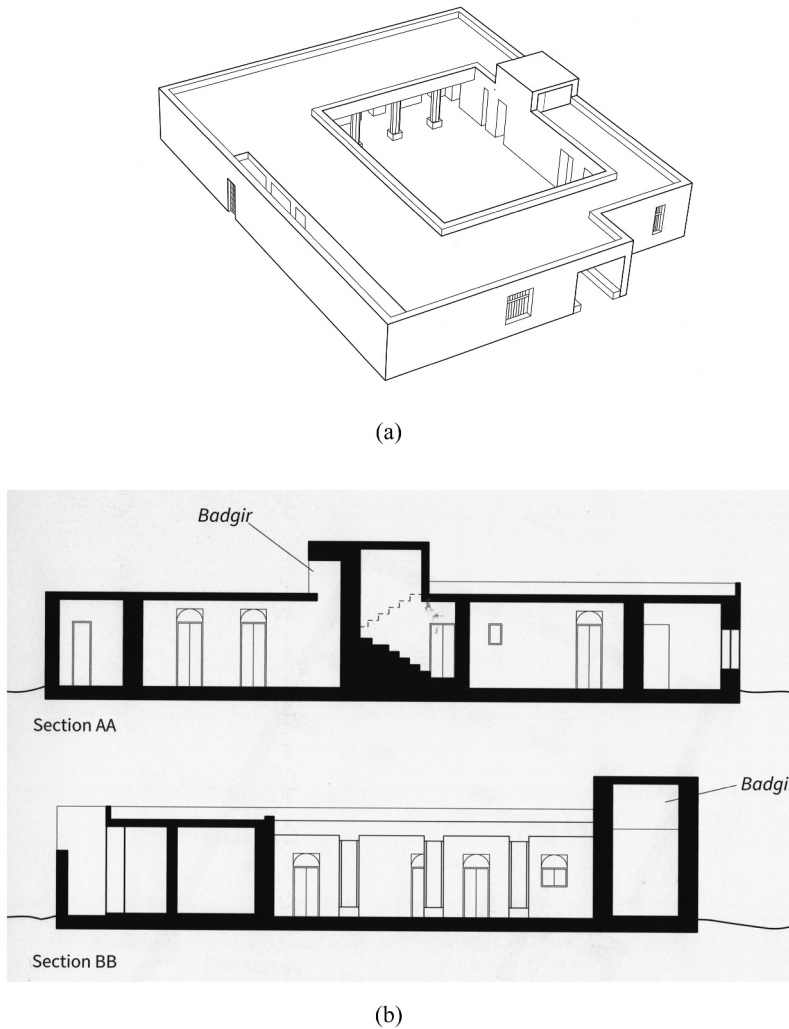
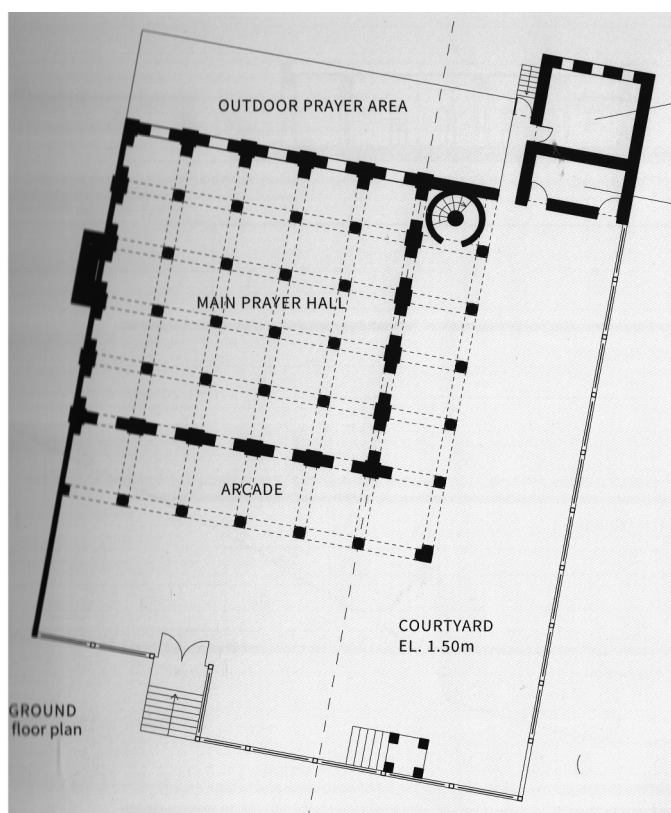


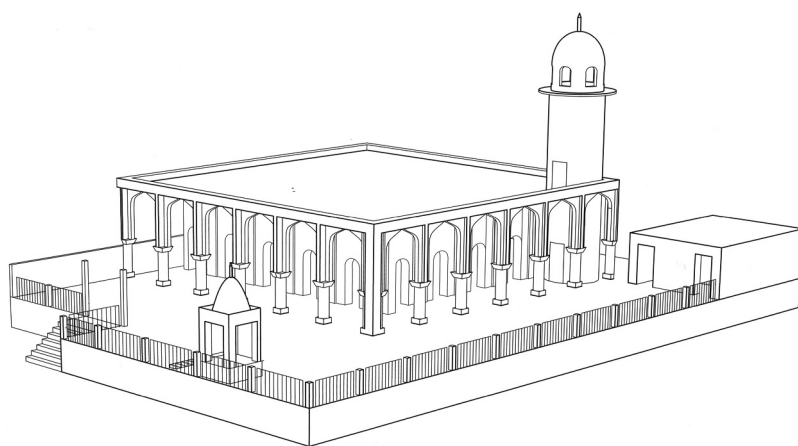
Figure 28. (a-b). Nassab House type axonometric and building section, Suru.

The present

Today, Bandar Abbas is the capital of Hormozgan Province. It is one of the most important southern ports of Iran and serves as the headquarters of the Iranian Navy [23]. It has an extreme humid/hot climate, with temperatures ranging between 44 and 2 Celsius degrees during the hottest and coldest days of the year, respectively. The average precipitation in the city is almost 200 mm. The city is surrounded by mountains to its north and the Gulf waters to its south. Geographically, the city is situated 9 m. above sea level in a flat, narrow coastal plain, whose general slope is from north to south and the port facilities. The River Shoor is the closest river to the city. The active Makran Fault deposits of Bandar Abbas plane and also the occurrence of severe past earthquakes, all show the high seismicity of this region.

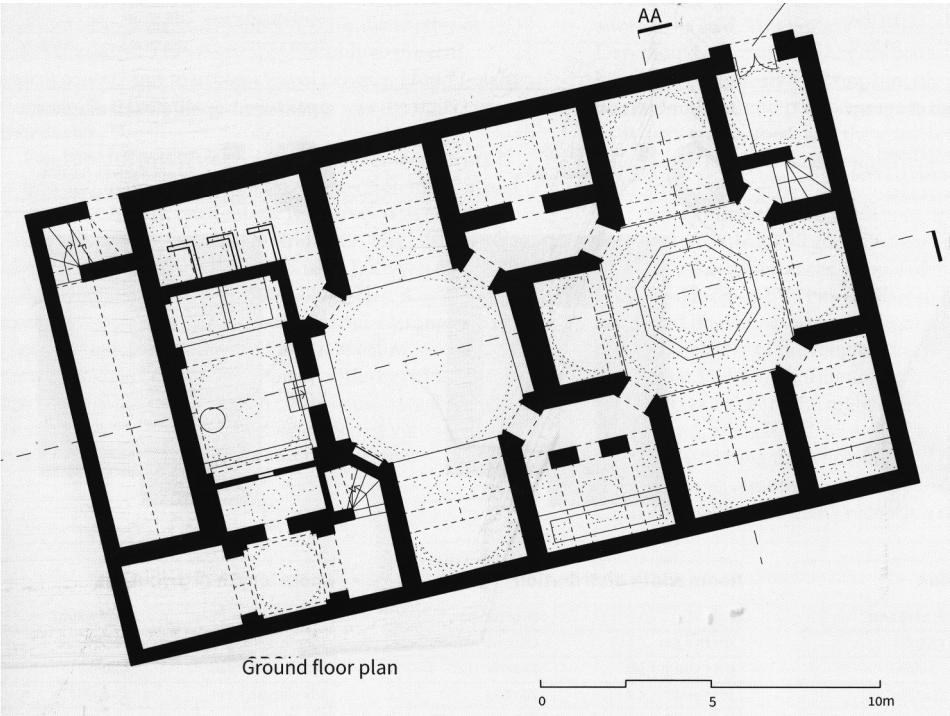


(a)

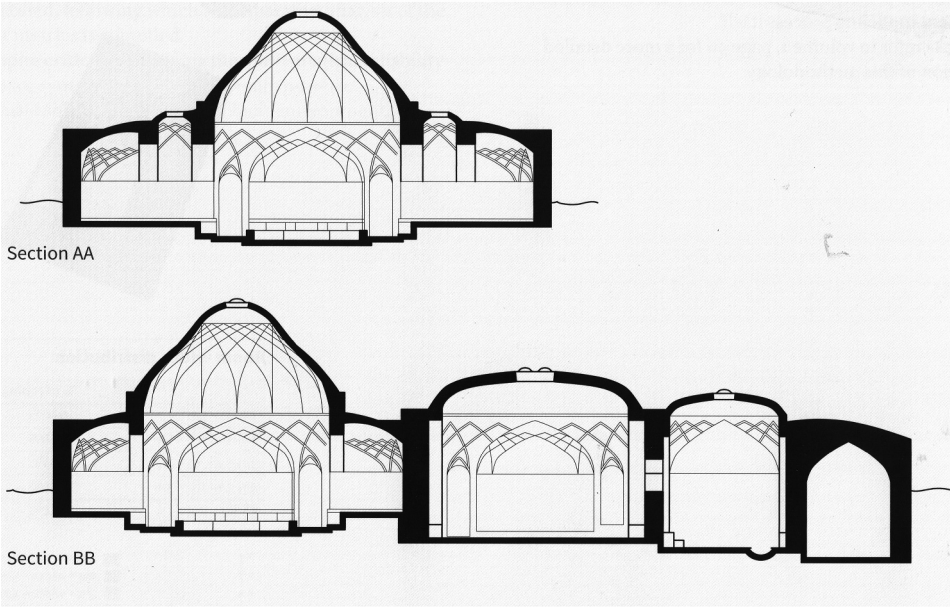


(b)

Figure 29. (a-b). Traditional Ghaledari Mosque, Bandar Abbas.



(a)



(b)

Figure 30. (a-b). Traditional Hammam Ghaledari, Bandar Abbas.



Figure 31. Satellite imagery of Bandar Abbas, showing the new port to the west, the expanding city in the middle and the international airport to the eastward future city expansion, 2009- Source: gateway to astronaut photography of Earth at NASA Johnson Space Center.

The first master plan for Bandar Abbas city was prepared in 1967 by Dr. Adibi Consultant Company. In this plan 2.3% population growth with a population density equalling to 100 people per hectare was predicted. The last master plan for Bandar Abbas city was prepared by Sharmand Consultant Company in 2005. The relatively low-density urban area of the city has changed from 403.77 to 4959.59 hectares between 1956 and 2012 [24]. Bandar Abbas has today expanded to a narrow, linear city stretching over 10,000 hectares, encompassing a major new port to the western precinct of the city and the international airport to the east (Figure 31) [15]. The current boundary of Bandar Abbas includes 74 separate areas and three regions, each being under the supervision of a different municipality [24]. Bandar Abbas is accessible by road networks to Sirjan and Kerman and is the southern terminus of Iran Railways' main North–South corridor.

The population has increased more than 30 times in the last six decades. The major part of population growth is related to migration from other parts of the country. The urban growth during 1956–2012 has been dramatic (Figure 32). According to the Iran Statistical Year Book the population of the city of Bandar Abbas was 526,648 and the province of Hormozgan was 1,776,415 in 2019, while around 99% of Hormozgan Province population are Moslem and the remaining 1% are Zoroastrian, Christian and Jewish [15]. Considering the projected 2.3% growth rate, the city will be over 820,000 by 2030. The most important economic activities in Bandar Abbas include heavy industries (commercial ports, fishing ports, oil and gas refinery, and other industries) and tourism, which employ about 74% of the active population. Annually more than 5 million international and national tourists visit Bandar Abbas and its nearby Islands. The newly built Emamzadeh Muzaffar in the city centre serves as an important pilgrimage site.

Because of this population increase and the topography, more than 80% of barren lands, stone cliffs, beach zone, and agricultural lands are now occupied by ecologically unsustainable sprawl developments [24]. The wealthier inhabitants of the old districts of

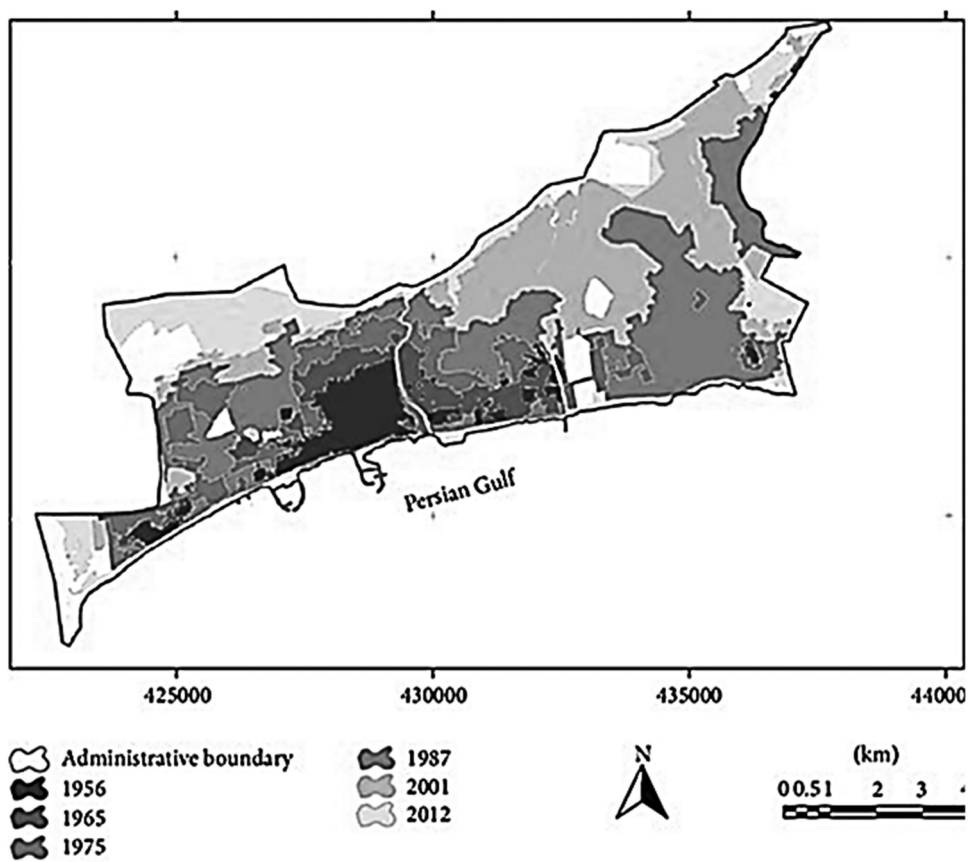


Figure 32. Bandar Abbas urban growth 1956–2012.



Figure 33. Aerial of city transitional areas.



Figure 34. Bandar Abbas coastline architecture.

Bandar Abbas city have migrated to the newer outskirts of the city and have been replaced by low-income groups who are not financially able to reconstruct or improve their new quarters. Deterioration of these historic districts is likely to continue. Regrettably, there is also a lack of environmental adaptation, architectural cultural identity or human scale in the new developments of the city (Figures 33-34).

Unfortunately, new urban construction and preservation rules that have not been honoured have brought about environmental risks in coastal zones. Similarly, in the city centre, adequate flood protection measures are lacking in regard to seasonal rivers that flood in rainy seasons, destroying large areas of urban land, causing financial loss and casualties. As a result of the irregular expansion and massive sprawl of Bandar Abbas, the city is in great need of effective urban environmental controls, particularly for anticipated rises in sea level because of global heating.¹ A change of outlook is necessary.

Conclusion

It appears that while the Arabian coast cities, enjoying unrivalled economic wealth, are building unsustainable vertical cities, epitomised by the world's tallest tower located in Dubai, the Persian coast cities, surviving under highly constrained economic pressures, are building equally unsustainable, horizontally sprawling flat cities, epitomised by the very high energy consumption of Bandar Abbas [25]. Neither model of city is sustainable. The destructive ecological and sociocultural impacts on both land and sea of each model will necessitate multi-disciplinary research studies to achieve a transition to sustainable urbanism.

In only a matter of fifty years, both coasts of the Persian Gulf have been plunged into carbon-based life patterns and urban developments that are significantly different, yet with similar high annual per capita electricity consumption and high carbon dioxide emissions

per person. These are major indicators of the pressures that have rapidly damaged the land, sea and air; eroding the cultural and architectural identity and wellbeing of their inhabitants, and leading their economies and policies to Unsustainable Future Scenarios.

What is now needed is realism. It is necessary to study the potential sustainability of the region's future, with research being supported by the eight Persian Gulf countries. The reasons why the region has survived in the past must be related to an environment-focused understanding for the future. There should be a shared understanding of the cultural/economic/political/ecologically based technical trends today. This holistic understanding may then permit these Persian Gulf cultures to recognise their possibilities and potentials for developing a post-carbon, sustainable way of life. Will there be an Ozymandias Legacy [26] or a brilliant sustainable future?

Disclosure statement

No potential conflict of interest was reported by the author(s).

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