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Maritime Cultural Heritage and Urbanisation in the Middle East and North Africa

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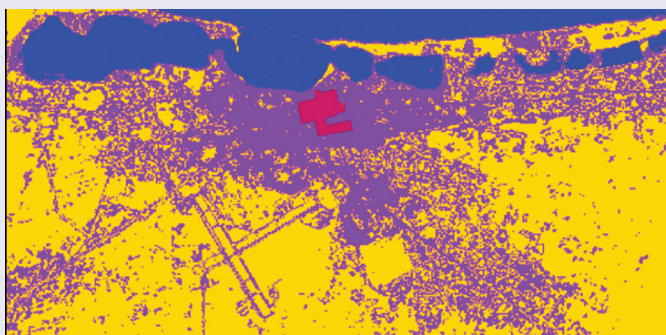
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ABSTRACT

Urbanisation, comprising development, land reclamation and population growth along coastal margins, continues to place significant pressure on the maritime cultural heritage (MCH), particularly in the Middle East and North Africa (MENA) region. Thus, there is a growing need for ascertaining the extent of the affected MCH resource and its condition. One such assessment is being undertaken by the Maritime Endangered Archaeology (MarEA) project, which is generating a unique informed database of the maritime resource in the MENA region. Through a regional overview combined with focused assessment on two case studies – Marsa Matruh (Egypt) and Bahrain – this paper demonstrates the threat urbanisation poses and the damage it has inflicted on MCH. The analyses and documentation that MarEA produces via remote sensing, desk-based and field-based assessments, constitutes a valuable resource that, at the very least, exists in digital perpetuity. It establishes a record that can be drawn upon to formulate targeted strategies and initiatives inclusive of the maritime cultural heritage resource.

KEYWORDS

Urbanisation; maritime cultural heritage; Middle East and North Africa; coastal development; Endangered Archaeology; heritage database



Introduction: Coastal and Urban Change in MENA

The value of coastal margins in understanding the past is unequivocal. Coastal environments afford a rich marine and terrestrial resource to be exploited and managed, as well as access to trade and transportation links. As such, they were often ideal or preferred

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locations for human settlement.¹ Their role in connecting spaces also makes them key locations from the standpoint of understanding past human activities, such as prehistoric migration and dispersal or networks of maritime trade and exchange.²

The socio-economic benefits provided by coastal areas continue to this day. Consequently, this zone has witnessed a heightened level of urbanisation, with more than 40% of the world's population living within 100 km of the coast, and 10% in coastal areas elevated <10 m above sea-level.³ Further, this zone is home to ever-growing industries such as shipping and offshore renewables which require substantial coastal and nearshore infrastructure.⁴ Unfortunately, this growth places considerable pressure on the environment, including both natural and cultural heritage, in the worst case, resulting in the irreversible loss of the heritage resource.⁵ Given the expectation that these trends in urbanisation and industrial development will continue in the future, concerted effort and attention should be directed towards managing and protecting maritime cultural heritage (MCH) in order to document the interplay between humans and their maritime environment in the past, as well the significance of this heritage to our modern-day society.

The Middle East and North Africa (MENA) region is no exception to the above scenario having undergone significant urbanisation with its urban population percentage of total population rising from 25% in 1960 to 65.6% in 2019.⁶ While modern urban development is disproportionate in the region given, for instance, countries affected by war that have suffered the destruction of their cities such as Aleppo in Syria, Benghazi in Libya and Al Hudaydah in Yemen, it has been rooted in economic and political drivers. As argued by Steiner and Wippel,⁷ urban change within the MENA region has been motivated by a series of trends such as the *Dubaiification* tendency, where Dubai functions as the ideal model of an urban city, the *worlding* endeavour which conveys the desire of states and cities to gain recognition on the world stage,⁸ and *neoliberalization*, as represented by the privatisation of urban spaces and attraction of foreign investors.⁹ At the heart of this lies an exterior motive to reshape the outlook of cities and the role they play on the world stage through, for example, branding and investment in monumental real-estate including waterfront developments, such as are particularly prevalent in the Arab Gulf Region.¹⁰

That said, not all urban expansion adheres to these trends, and local circumstances are crucial to understanding the process and manifestation of urban growth. One key driver in the MENA region, apart from natural demographic growth, is the relocation of people internally and across borders to cities. Given that MENA's urban centres are often located on the coast, this has led to a highly concentrated population here, a process known as littoralisation.¹¹ It is also worth noting that urbanisation across the MENA region is far from uniform. For instance, the most urbanised Gulf coastal cities (e.g., UAE, Bahrain, and Qatar) already had a long-standing tradition of coastal settlement given the harsh climate and lack of resources for inland rural activities in the Arabian Peninsula.¹² However, as the oil industry developed, they grew rapidly to become the urban Gulf centres of today.

As the degree of coastal urbanisation has increased and continues to do so, it has the potential to directly impact on MENA's MCH particularly where development is unregulated or where maritime heritage is not integrated effectively into development plans. An essential requirement for effective management of the MCH resource is a baseline inventory which summarises critical information such as site location, type, condition, vulnerability, interpretation and so on. Modern inventories (e.g., Historic Environment Records,

Sites and Monument Records) generally take the form of geospatial databases, often accessible online. The advantage of these is that their geospatial nature facilitates integration with other spatial data such as used in development planning. With this information in hand, heritage managers are thereby able to determine likely impacts on the heritage resource and can make informed decisions on mitigating or reducing impacts. Within the MENA region, the availability and quality of such inventories are highly variable, ranging from comprehensive ones (e.g., Qatar's National Historic Environment Record¹³) to non-existent (e.g., Yemen). Consequently, a number of recent efforts have been made to compile/produce inventories generally based on a combination of remote sensing assessment and literature review.¹⁴ One such initiative is the Maritime Endangered Archaeology (MarEA) project, which is investing into generating a baseline record of MENA's MCH and ascertaining the condition of sites.

MarEA is rapidly evaluating maritime heritage within the coastal and submerged zone of the MENA region through remote sensing, desk-based assessment, and field-based surveys.¹⁵ It generates records of the archaeology and its state of preservation along with known disturbances and potential threats. This information is stored within the open-access database (<https://database.eamena.org/en/>) of the Endangered Archaeology in the Middle East and North Africa (EAMENA) project, hosted by the University of Oxford.¹⁶ It is of course acknowledged that urbanisation or for that matter wider anthropogenic activities, are not the only threat coastal landscapes face. Coastal landscapes have always been in a state of flux. At variable timescales, natural and human-induced changes led (and are still leading) to landscape alterations, sea-level fluctuations and shifting environments.¹⁷ Since the Last Glacial Maximum (LGM) at ca. 20,000 years BP, global sea levels have risen more than 100 m, inundating coastal regions rich in archaeological evidence.¹⁸ Exacerbated by climate change, coastal erosion and extreme weather events,¹⁹ natural impacts continue to modify coastal margins today. However, anthropogenic activities, most notably urban expansion and development, have witnessed a sharp rise across the world over the last century, amplifying damage and destruction on the archaeological resource.²⁰ Thus, the disturbance that coastal urbanisation poses is one of main threats that the MarEA project addresses as part of documenting and assessing coastal and submerged sites and their condition across the MENA region.

This paper aims to provide an assessment of the impact of urbanisation on MCH in the MENA region. This is done firstly through a regional-scale overview which uses all records documented by the MarEA project from its inception in 2019 up until March 2021. As documentation of MCH progresses systematically within the region, to date, MarEA has generated over 5,000 database records within 25 km inland off MENA's coastline. These records are sufficient to start highlighting patterns and enable the characterisation of the broad trends in disturbance which have impacted archaeological/heritage sites in the countries documented to date. Secondly, two cases studies – the coastal city of Marsa Matruh (Egypt) and the Bahrain archipelago – are presented. These demonstrate in detail using the MarEA documentation as the core evidence base, local patterns of urbanisation in space and time and their corresponding impact on MCH.

Although the documentation of MCH and relevant threats does not eradicate the damage MCH might have sustained and could face, it presents a unique informed record that can be drawn upon by heritage authorities, charities, international organisations, and researchers, to formulate targeted strategies and initiatives inclusive of the MCH resource.

Documenting and Assessing the Impact of Urbanisation

Documentation of MCH and its condition across the MENA region by MarEA relies on the assessment of satellite imagery, aerial photographs, historical maps, published literature and archival material. Through mapping past and projected coastal and land-use change,²¹ the known condition of, and disturbances acting upon, the heritage resource are documented using the constrained thesauri of the EAMENA and MarEA database, which are themselves built on the CIDOC-CRM ontological model for cultural heritage.²² Analysis of database records and disturbances endured by MCH in the MENA region demonstrates that, apart from natural and unknown threats, activities relating to infrastructure/transport, building and development, as well as agricultural and pastoral, are the most prevalent (Figure 1).²³

Spatial density mapping of these disturbances along MENA's coastline based on thus far documented MarEA records highlights areas where these three categories have had the most impact (Figure 2).²⁴ Building and development disturbances are mostly concentrated in the Arabian Gulf, the coasts of Libya and Egypt, as well as the Levantine coast of Lebanon and Syria. Agricultural and pastoral disturbances on the other hand are primarily concentrated on the Mediterranean coast. Finally, the density of infrastructure and transport activities, resembles and probably relates to that of building and development (Figure 2). Nevertheless, differences are evident in the Red Sea and Oman, where infrastructure and transport disturbances are more prominent.

These patterns of disturbance reflect those of urbanisation. As seen in Figure 3, built-up/urban land cover in the MENA region, as depicted by the Global component of the Copernicus Land Monitoring Service using 100 m-spatial resolution satellite imagery from

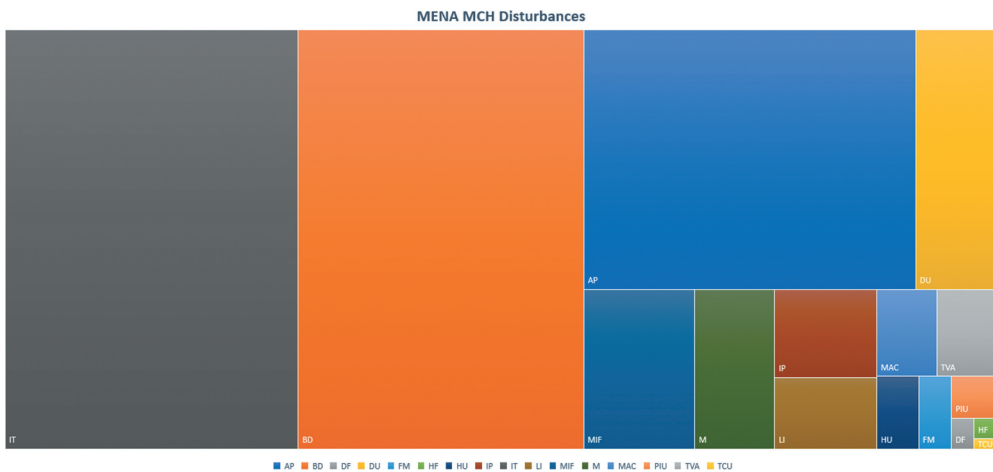


Figure 1. A treemap chart of MarEA's documented disturbances acting upon maritime heritage sites in the MENA region. The list excludes natural and unknown disturbances. Note the prevalence of disturbances due to infrastructure/transport, building and development, and agricultural/pastoral activities. AP: Agricultural/Pastoral; BD: Building and Development; DF: Defensive/Fortification; DU: Domestic Use; FM: Funerary/Memorial; HF: Hunting/Fishing; HU: Hydraulic Use; IP: Industrial/Productive; IT: Infrastructure/Transport; LI: Looting/Illegal Activities; MIF: Management and Institutional Factors; M: Maritime; MAC: Military/Armed Conflict; PIU: Public/Institutional Use; TVA: Tourism/Visitor Activities; TCU: Trade/Commercial Use.

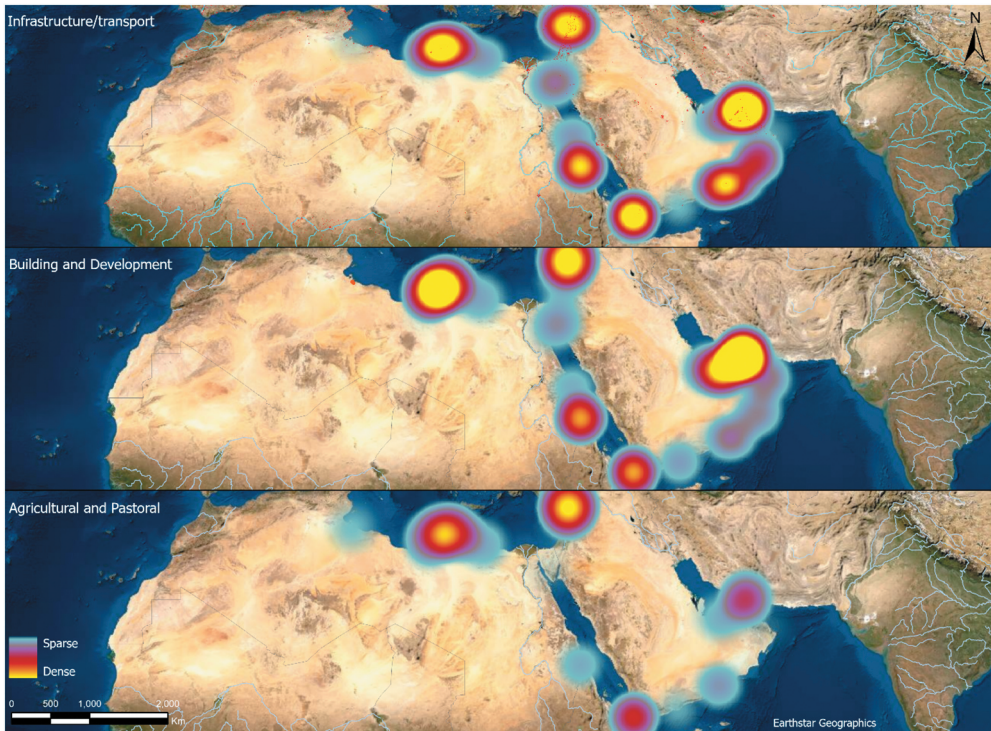


Figure 2. Spatial distribution of the density of the most dominant disturbances along MENA’s coastline. The spatial density scale is constant across the three categories in order to enable comparison.

2019, concentrates mainly across coastal areas.²⁵ Particularly high concentrations of urban sprawl can be observed along the coastlines of the UAE, Saudi Arabia and Bahrain, and correspond to the urban development trends discussed earlier. The Mediterranean coast of Lebanon is also heavily urbanised, as are patches of the Egyptian coast along the Nile Delta, the western Libyan coastline, as well as Tunisia and Algeria.

While these general observations are useful in highlighting the regional-scale trends, in isolation they cannot demonstrate the damage caused by and impact of urban expansion. This will now be addressed via two detailed case-studies which are able to highlight impacts on a local level and thus give a clearer understanding of the risk posed by urban expansion if not managed and integrated with measures for safeguarding the heritage resource.

Urbanisation at Marsa Matruh, Egypt

Egypt is one of the most agglomerated countries in the world. Most of the population (95%) lives on only 5% of the land, predominantly along the River Nile and the Nile Delta.²⁶ Over recent decades, Egypt has seen rapid increases in coastal urban populations, with the Egyptian Mediterranean coast experiencing a 62.6% increase between 2000 and 2016.²⁷ Along the northwest coastline of Egypt, the population is clustered in

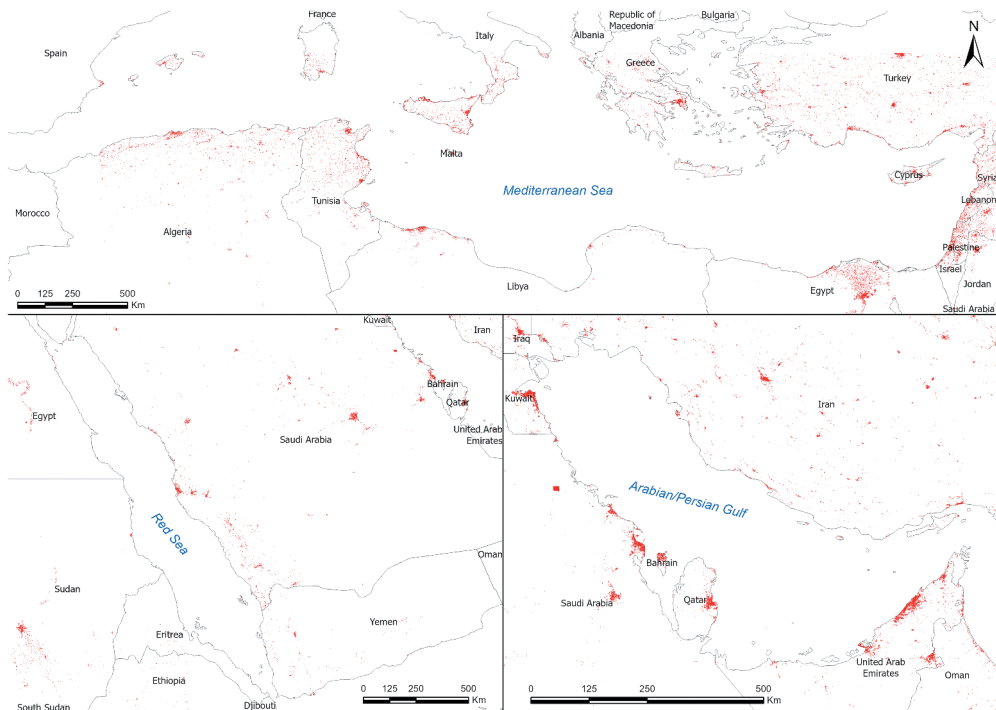


Figure 3. Built up/urban land cover (in red) derived from the Global component of the Copernicus Land Monitoring Service.

relatively few areas that are exploited for tourist resorts, harbours and power plants.²⁸ This clustering is mainly due to the natural topography; predominantly rocky cliffs which afford little opportunity for safe sheltering of vessels and the establishment of ports and harbours.²⁹

In contrast, the port city of Marsa Matruh is ideally placed in one of the few areas which provide safe anchorage for ships. Protection is afforded by a series of lagoons with a natural breakwater creating relatively low-energy conditions in which to seek shelter.³⁰ Marsa Matruh lies 240 km west of Alexandria, on the main route from Alexandria to the Libyan border, as well as connecting southwest to Siwa, thereby occupying an important crossroads for transport links by land and sea. Until recently it was the only significant harbour between the Nile Delta and Sollum on the Libyan border. During the early twentieth century Marsa Matruh was a small town, described as comprising a cluster of local Bedouin families, as well as some Europeans.³¹ Today, the city is a tourist resort offering recreational beaches, particularly popular with Egyptians.³² In addition to tourist facilities, there is a modern harbour, a two-runway international airport, a power station to the north of the western lagoon, and an urban sprawl that is constantly expanding (Figure 4). In 2003 the population of the city was approximately 100,000 people and, according to the Governmental census, 500,000 tourists were estimated to have visited the area in 2004.³³ As a result of the high rates of urbanisation, tourism, agriculture, and resource extraction, the environment and landscape—not to mention the maritime cultural heritage – of Marsa Matruh is under severe pressure.³⁴

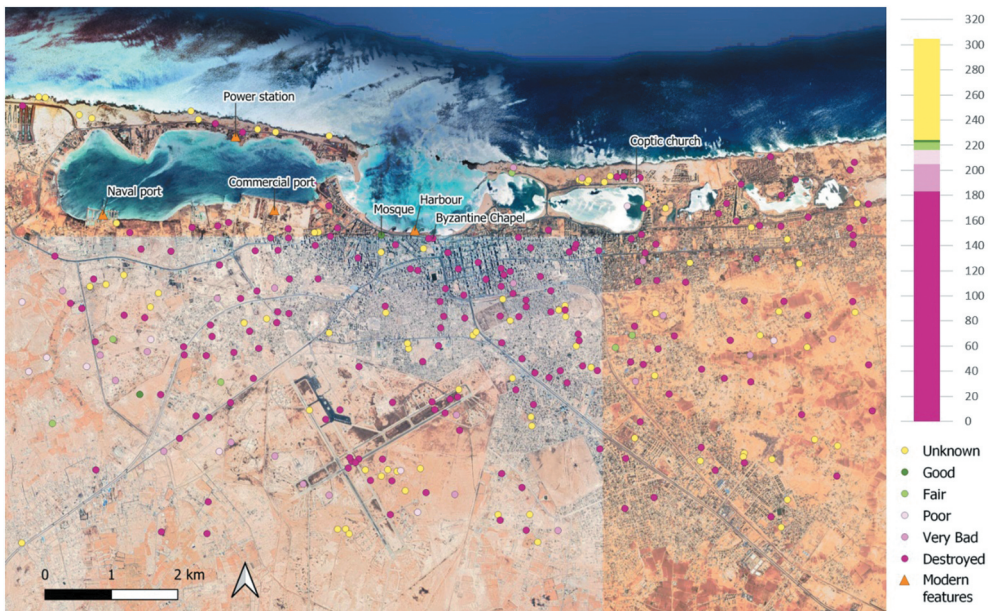


Figure 4. Marsa Matruh with locations of some modern structures mentioned in the text and cultural heritage sites documented by MarEA and identified using records from published fieldwork and the analysis of satellite imagery and historical aerial photographs. Sites are indicated according to their documented condition. Bar chart shows the numbers for each site condition. Basemap: © Maxar via Google Earth (2020).

Activity at Marsa Matruh can be traced back to the Bronze Age, although many of the archaeological remains date to the Roman period, when the town was known as Paraetonium.³⁵ During the Second World War, especially in 1942, substantial damage was inflicted on the town through heavy bombing and shelling.³⁶ This was not, however, the main cause of damage to cultural heritage in the area. Urbanisation has been – and continues to be – a significant cause for the loss of heritage. MarEA’s documentation of MCH in the area, derived from published fieldwork and the analysis of satellite imagery and aerial photographs, shows that urban expansion over the last century has destroyed 60% of cultural heritage features in and around Marsa Matruh (Figure 4). Indeed, it is probable that this figure is closer to 80% because features classed as being in an ‘Unknown’ condition are predominantly identified from georeferenced maps (77 out of 81), meaning establishing their exact locations is not currently possible. However, they are unlikely to have survived judging by their approximate locations in the landscape. Evidence for urbanisation can be obtained by comparing early 20th century aerial photographs with satellite imagery from 1990 and 2020 (Figure 5). Expansion in all directions on land is observable, primarily following the main transport links and water-side locations.

One area that has been particularly impacted by urbanisation, is the ancient harbour and the western lagoon. Fourtau and Bates identified the southern shore of the main harbour and the coastal ridge north of the western lagoon, as the location of the core of the Roman town.³⁷ Of significant note are reports of harbour facilities in the south-eastern

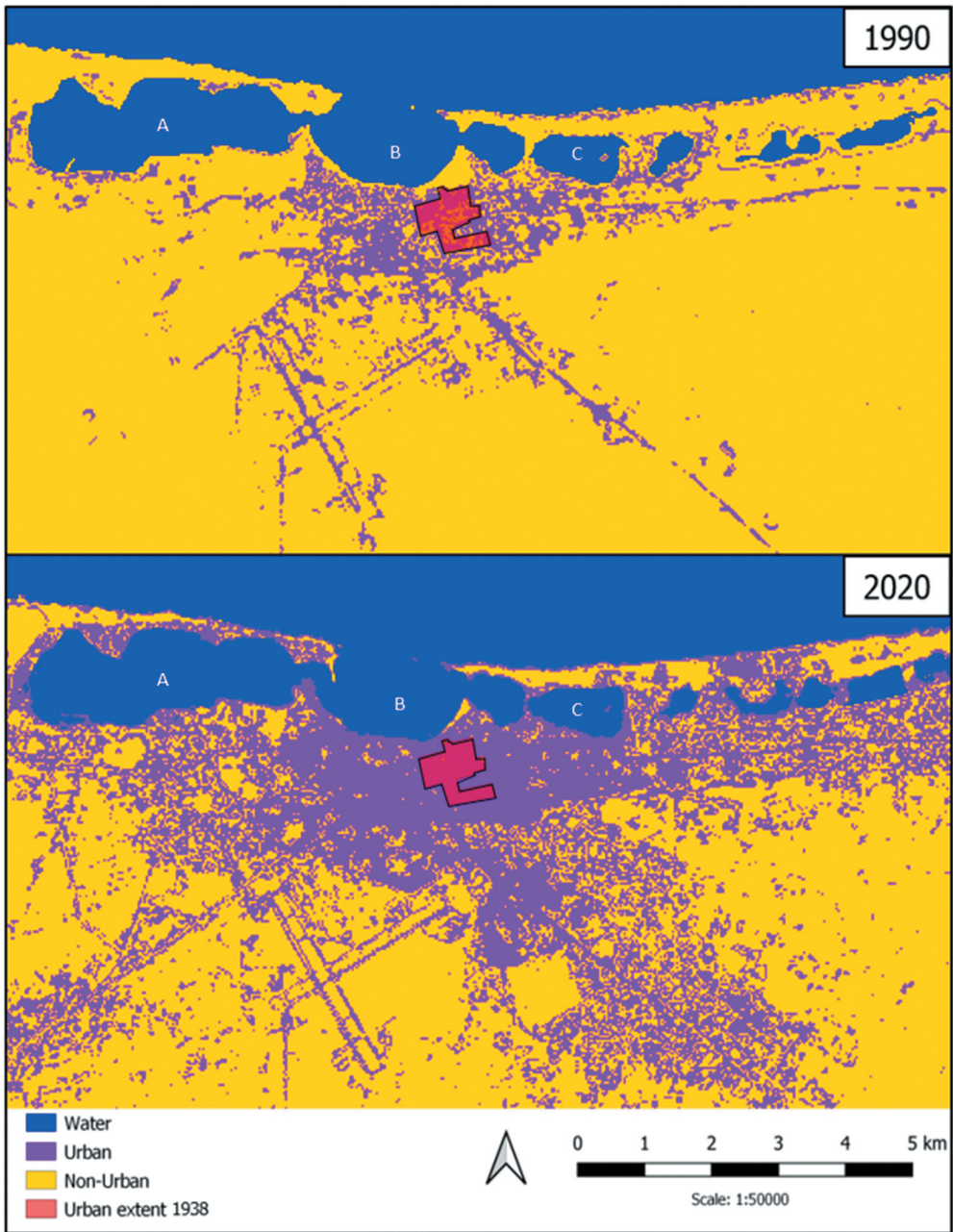


Figure 5. Unsupervised classification (represented in 3 colours) highlighting the urban expansion of Marsa Matruh between 1990 and 2020 produced from a Landsat 5 image (1990) and Landsat 8 image (2020). The urban extent from 1938 is derived from aerial photographs. A = Western Lagoon/location of Roman harbour; B = Central Lagoon; C = Eastern Lagoon.

corner of the western lagoon, comprising a cut-stone quay with stone jetties projecting into the water, with stone towers at both ends.³⁸ The installation of modern features, such as a concrete deep-water commercial docking facility along the southern shore of the

western lagoon between 1978 and 1983,³⁹ have unfortunately destroyed any ancient features formerly documented by Bates and Fourtau.⁴⁰ Since then, other significant developments include the extension of the naval harbour after 2016, and the construction of jetties and docks in the central lagoon between 2018 and 2019. Additionally, Bates believed Marsa Matruh to be the location for the destruction of Mark Antony's fleet after the Battle of Actium in 31 BCE.⁴¹ There is, however, no conclusive evidence for this due to the western lagoon having been dredged by the Egyptian Navy prior to the mid-1980s, thereby destroying any possible evidence.⁴²

Overall, the sheltered location of Marsa Matruh has made it an attractive area for human settlement and economic activity. In turn this has resulted in severe pressure from high rates of urbanisation, tourism, agricultural expansion and resource extraction, demonstrating that, in this case, the main threats to cultural heritage are from human activity. The changing landscape of Marsa Matruh (Figure 5) has resulted in the destruction of many cultural heritage sites through urban expansion and harbour development. Despite this, however, there are examples of structures that have survived through continued use, such as the mosque, or through protection, as is the case of the remains of an early Coptic church (Figure 4).

Marsa Matruh is not the only location along the north-western Egyptian coastline that is experiencing the loss of cultural heritage through continued development. Approximately 70 km to its west, at Marsa Gargub, a large commercial and military port was inaugurated in July 2021. This port continues to be developed and will cover over 10 km², seriously impacting, if not destroying, the Hellenistic and Roman site of Chautaiion/Chettai, of which very little is known to date.⁴³ A further port is planned in the outskirts of Sidi Barrani, c.110 km west of Marsa Matruh, with investment estimated to be €1.6 billion; this is part of the north-western coastal development project, one of Egypt's three main components of the *Strategic National Plan for Urban Development – Vision 2052*, which was officially announced in 2014.⁴⁴ These rapid developments are problematic since the area west of Marsa Matruh has not yet been surveyed and documented in detail, and much of the archaeology will likely be lost in their wake. Thus, the need to assess and document at-risk maritime cultural heritage along the northwest Egyptian coastline is great in the face of rapid development.⁴⁵

Bahrain's Heritage and Urbanisation

The Kingdom of Bahrain in the Arabian Gulf is an archipelago of 465 km² formed by 33 natural islands and a growing number of artificial ones. The island group is dominated by three large islands: Bahrain, Muharraq and Sitra.⁴⁶ Over the past 70 years, Bahrain has seen an exponential population increase and substantial industrial and urban development. Its population grew from 116,000 in 1950 to 1,641,172 in 2020, ranking the Kingdom as the first and sixth most densely populated country in the MENA region and the world respectively.⁴⁷ Accommodating this growth within the relatively small archipelago, has, within the last 20 years, led to extensive land reclamation and urban expansion. Not only has this threatened the Kingdom's MCH and its coastal landscapes, but also the submerged cultural resource particularly through dredging activities and the construction of shipping infrastructure for oil and gas, commercial transport, passenger, leisure, and

fishing. Moreover, Bahrain's population will continue to grow to a projected 2.3 million inhabitants by 2050.⁴⁸ This substantial surge will add additional pressure on the MCH as the need for housing and infrastructure intensifies.

Today, most of Bahrain's population is concentrated in the capital Manama and its twin city Muharraq both located on the north-eastern end of the archipelago (Figure 6), a strategic position which offers shelter from the prevailing north-westerly winds. Manama and Muharraq are relatively small compared to other coastal cities in the Gulf such as Doha, Abu Dhabi, or Dubai. However, Manama has been transformed from a quiet town to a thriving modern city, driven by investment in tourism, finance, and trade.⁴⁹ As Bahrain's economy began to thrive and Manama's population grew significantly, a master transport network plan was created in the 1960s and 1970s including development projects, some of which are ongoing to this day. The early plan consisted of a ring road linked to the main highways inter-connecting Manama and other neighbouring towns.⁵⁰ A key feature was the construction of causeways that would interlink the archipelago, including the 1.5 km long Sheikh Hamad Causeway connecting Manama and Muharraq.⁵¹ Building work also included large areas of land reclamation, and an extensive expansion of the international airport in the region of Muharraq. Overall, Bahrain's infrastructure and layout has been completely transformed over the last 40 years, with the 1970–1990 city planning having a major impact on MCH and its surrounding landscape. Currently, the municipality zoning system includes archaeological sites and buffer zones monitored and managed by the Bahrain Antiquities Authority (BACA).

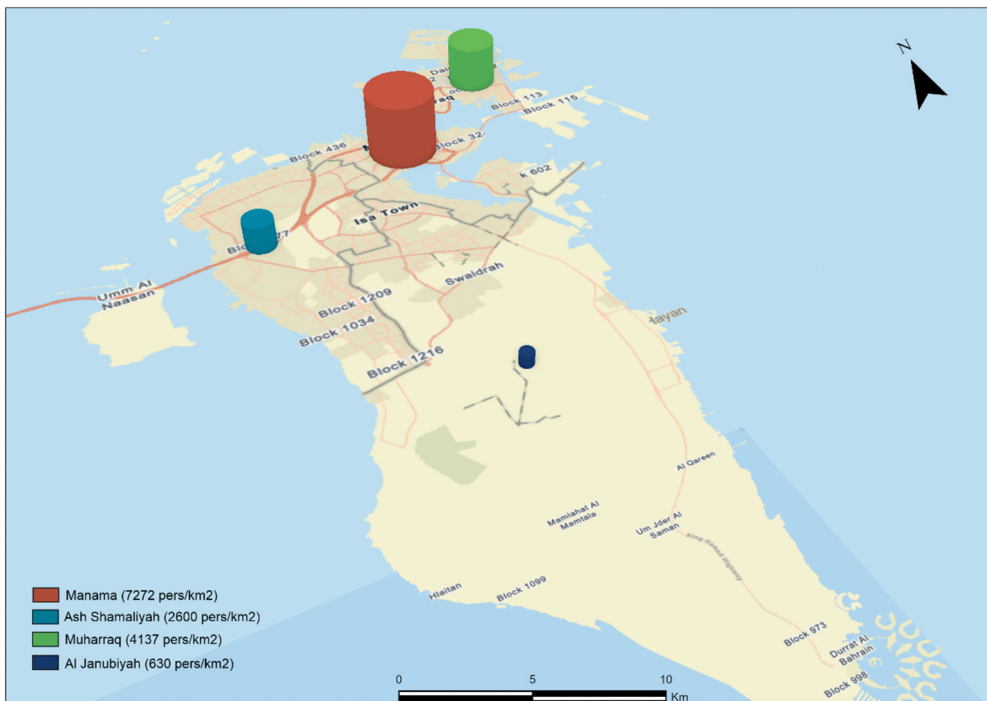


Figure 6. Bahrain population density per km² by governorate. Data derived from the 2020 census listed on Geo-Ref (<http://www.geo-ref.net/ph/bhr.htm>).

One of Bahrain's oldest archaeological evidence comes from Qala'at al-Bahrain, near Manama. The site was Bahrain's main urban centre in antiquity, dating as far back to the Early Dilmun cultures, ca. 2500 BCE.⁵² It represents one of the largest and ancient tells in the Gulf region. The earliest evidence from Muharraq, on the other hand, dates to the 7th-8th centuries CE (Umayyad Period) and is limited to scattered material discovered during an excavation in Fort Bu Maher.⁵³ Cartographic representations, as early as the 1630's, depict a circular tower in what is now known as Fort Bu Maher (Figure 7). From 1520–1783 CE the Portuguese, the Persians, and the Omanis had control over the archipelago. During this period, Manama and Muharraq were small fishing towns of secondary importance. Understanding the early stages of urban development of the coastal towns of the Gulf is difficult given limited historic sources and the use of perishable construction material. However, both Manama and Muharraq gained their current designation around 1780, under the rule of the Al Khalifa family from 1783. It was then that Muharraq became the capital city.⁵⁴ Principal alterations to Manama and Muharraq started in 1932, when the Bahrain Petroleum Company (BAPCO) started extracting oil. Subsequently, the oil industry transformed the Kingdom radically and shifted the centre of power to a new capital – Manama. The focus on oil extraction also shifted population movement away from Muharraq and led to the abandonment of traditional maritime practices, mainly pearling and fishing.

The MarEA Project has recorded the main maritime heritage resource e.g., historic and traditional buildings, wrecks and fish traps, of Manama and Muharraq through remote sensing, and also assessed coastal change and urban expansion via comparison of declassified satellite images dating to 1967 and recent satellite imagery from 2020 (Figures 7 and 8). This documentation and analysis have highlighted areas significantly impacted by urbanisation including modified buildings and disturbed groves. Furthermore, as shown in Figures 7 and 8, land reclamation in the last 40 years has transformed the maritime landscape of Muharraq and Manama, and probably has led to the loss or burial of valuable submerged MCH assets. For example, a potential shipwreck found during the construction of the old coastguard station at Bu Maher Fort, has been lost to coastal development, together with any evidence of submerged settlements or maritime activities of earlier periods e.g., underwater springs, structures, and scattered material.⁵⁵ Additionally, close to Manama, Qal'at al-Bahrain has been exposed to major impact due to urban growth and land reclamation. Currently, the site is a nominated UNESCO World Heritage Site with an extensive land and marine buffer zone protecting the area from further development.

The main MCH assets in Muharraq are the Pearling Path World Heritage Sites (WHS's) which comprise of 18 houses/properties. Importantly, these have survived development because they are appropriately managed, with for example primary and secondary protection buffer zones within which construction without previous authorisation from the Ministry of Culture and Information is prohibited. In addition, great efforts have been made by BACA for the restoration of the entire old city of Muharraq. Other than the Pearling Path WHS's, another 600 old buildings are being restored, making the old city one of the best-preserved historic cities in the Gulf.⁵⁶ In contrast, Manama's early to mid-20th century buildings that constituted the oldest and largest historic neighbourhood, Fareej Kanoo (Figure 8), have been heavily affected by modern development, which has transformed Manama into a densely populated urban

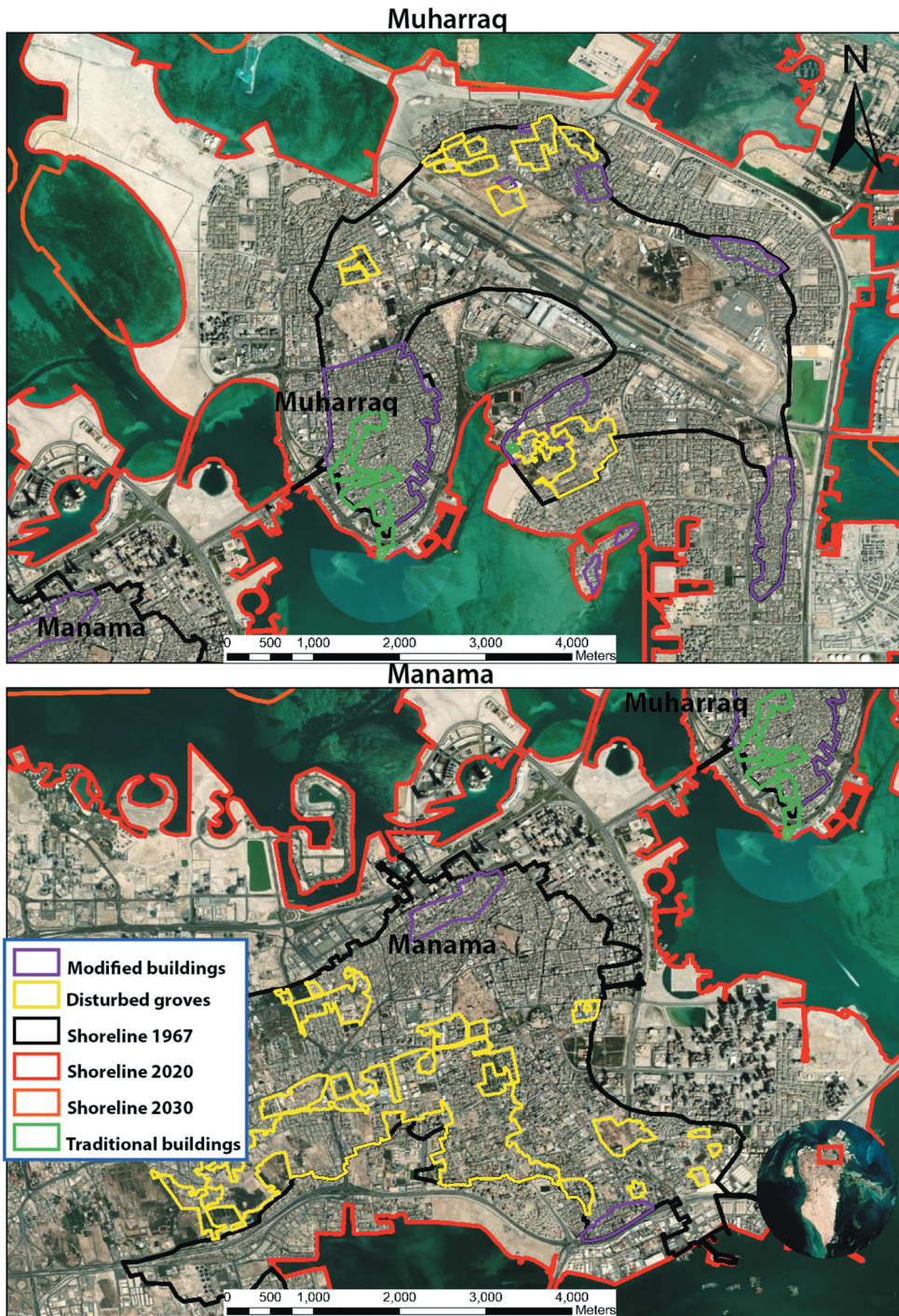


Figure 7. Identification of main landscape alterations and impact on MCH in Manama and Muharraq: 1- shoreline change between 1967 (derived from declassified Corona spy satellite imagery) and 2020 (based on Google Earth). Note the considerable growth in land areas resulting from reclamation; 2-Traditional buildings; 3-Disturbed traditional Groves and gardens; 4- Modified buildings, either traditional or early to mid-20th century structures that have been abandoned, demolished, or experienced disturbance (this identification is based on literature review, archival research, and satellite imagery).

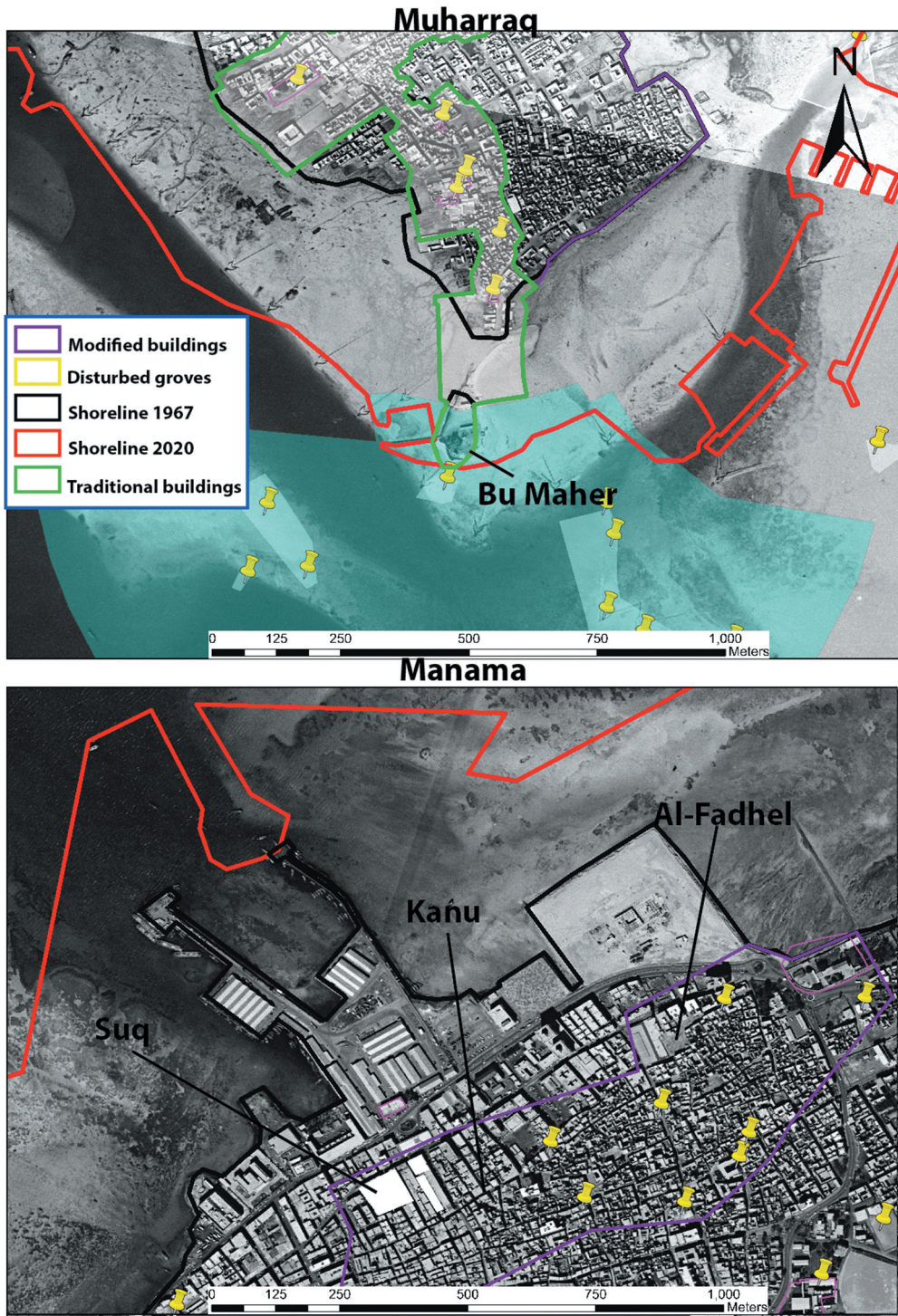


Figure 8. Detailed assessment of Manama and Muharraq's cultural heritage overlaid on declassified Corona imagery from 1967. Main features in Manama include the Fareej Kanoo, the old Suq, and historic features (indicated by yellow pins). In Muharraq, yellow pins indicate traditional houses, fish traps, and wrecks that have been documented through archival/literature research and remote sensing assessment.

environment.⁵⁷ Heritage disturbance in most areas is due to land-use change and housing projects that damaged/destroyed traditional palm groves and gardens (Figures 7–8). Public spaces, such as the Suq (market) and the port, have been radically altered during the second half of 20th and early 21st centuries because of urban expansion and land reclamation (Figure 8).

The shift in economic activities of the Bahraini population and the need for modern infrastructure (roads, power stations, refineries, ports, harbours, housing, recreational areas, etc.) led to a gradual abandonment of traditionally built houses and early 20th century buildings. Some of these perished or were demolished to make way for new buildings. Even though the implementation of marine protection, cultural development and sustainable environmental policies are an essential part of Bahrain's National Strategy, the maritime landscape of Manama and Muharraq has been substantially impacted by land reclamation.⁵⁸ This seems to be taken into consideration in the 2030 National Land Use Strategy, a manifesto to manage sustainable growth, that also accounts for its invaluable MCH. The driving force behind this initiative is Sheikha Mai Al-Khalifa (Her Excellency Sheikha Mai bint Mohammed Al Khalifa, Minister of Culture & Information, Kingdom of Bahrain) who plays a key role in identifying, administering and strategizing these projects, as well as in raising funds to sponsor rehabilitation activities and promote social and cultural activities. The holistic approach of UNESCO's Pearling Path WHS's in Muharraq, is a great example of how to revitalise the past in its embedded modern spatial context.⁵⁹ Despite these efforts, the documentation and assessment of Bahrain's MCH demonstrates the need for continuing efforts to address at-risk sites, particularly within Bahraini waters and around the large urban centres such as Muharraq and Manama, which are due to dramatically expand well into the 21st century.

Discussion

This regional-scale overview has highlighted the impact of urbanisation on MCH across the MENA region, with the two case studies showing specific impacts in more detail, exemplified for instance by harbour development and modernisation, coastal reclamation, and land-use change due to population growth. While the drivers for urbanisation may differ according to local needs and national agendas, this process brings a range of concomitant factors such as resource extraction, tourism intensification, and importantly, landscape and environmental alterations. The risk these collective factors place on MCH is substantial. If not destroyed, as shown in the case-studies with 60% of MCH lost in Marsa Matruh for instance, the resource sustains damage and remains threatened by future potential and planned developments.

This is not to say that the many drivers of urbanisation in the MENA region are not warranted for the sake of growth, in fact in many cases, they play a vital socio-economic role. For example, new or modified port infrastructure supports access to national and international markets, while waterfront development and marinas attract tourism, both major economic pillars in many MENA countries.⁶⁰ Littoralisation brings opportunities to both communities and individuals relocating to the coastal zone for economic stability, and new attractive investments and projects raise a country's profile on the world stage.⁶¹ It is only when MCH is not accounted for, not managed, or valued throughout the process

of development from concept to execution and beyond, that such urbanisation-led activities morph into threats. As noted, this can be a consequence of many and varied drivers that can at times take on quite culturally and even regionally specific characterisations. If we return to the two countries from which the case studies were drawn: Egypt and Bahrain, and further examine the wider and differing agendas that drive and control urbanisation, then the context of this complexity is further illustrated.

In Egypt, a mainstream top-down planning paradigm dominates, one rooted in a strong belief in high modernity and physical planning. The roots of some of the modernisation projects are decades old, such as the Toshka New Valley Project, proposed in the 1960s at a time when modernist ideologies prevailed.⁶² The conventional planning diagram, as Ibrahim explains, evolved from a modernist to a capitalist dream in the 1970s-80s with the policy to build new urban communities in the desert in the 1980s, followed by neo-liberal planning exemplified by grand plans such as Cairo 2052.⁶³ Meanwhile, cultural heritage throughout has been threatened, particularly non-Pharaonic or non-religious heritage. The city of Esna in Luxor on the Nile River, for instance, is rich in Pharaonic, Roman, Coptic, and Islamic history, with strong local traditions. When tourism became a major income for the city in the second half of the 20th century, as part of the influx created by the passing Nile cruises between Luxor and Aswan, the Esna Temple was its main attraction.⁶⁴ However, the building of a new barrage removed Esna from the Nile cruises' path causing the city to lose its touristic role and fall into decay. Esna, in its touristic prime, was promoted for its Temple; it underwent major alterations to the fabric of the city under the premise of making the city more appealing to tourists, such as isolating the touristic zone from its local environment.⁶⁵ In safeguarding and promoting one aspect of Esna's heritage, both its rich tangible and intangible heritage, and multi-faceted history suffered. The prioritisation or neglect of one type of heritage over the other in accordance with a top-down agenda is particularly problematic and leads to the irreversible loss of cultural heritage. Marsa Matruh also has a multi-faceted history but does not have grandiose, pharaonic ruins, meaning that the potential of its heritage as a tourist destination was minimal from the outset resulting in limited protection. Consequently, heritage suffered as priority was given to the development and modernisation of the coastal region and harbour area, and will likely be impacted by upcoming development, particularly the north-western coastal development project as part of Egypt's *Strategic National Plan for Urban Development – Vision 2052*.⁶⁶

Bahrain presents a different urbanisation scenario whereby foreign models of urbanisation were introduced with the discovery of oil in the 1930s. Partly led by lucrative oil industry and other factors such as the production of cultured pearls in Japan, the pearling industry with its prominent centre in Muharraq ended.⁶⁷ Where Bahrain's local population was essentially pearl divers, farmers and fishermen living in coastal and farming villages, the discovery of oil in the south directed urban growth towards the desert hinterland, and its revenue led to the construction of new towns and compounds that failed to integrate with the existing urban fabric.⁶⁸ Despite being a place whose history is rooted in the sea, the sea was the first to be sacrificed in land reclamation efforts for economic benefits from as early as 1930s in Muharraq, destroying traditional fishing grounds, agricultural and palm groves (see case study above). Urbanisation shifted in Bahrain in the 1990s when real estate development presented an economic opportunity rather than a functional one, leading to the privatisation of the coastline and making it difficult for the locals and

fishermen to access the sea.⁶⁹ This inevitably has had an impact on how society perceives itself, from one largely connected to the sea to one detached from it, a narrative that was further reinforced by changes in Bahrain's representation of its identity in the media.⁷⁰ Throughout this process, as the case study above highlights, a large part of the traditional tangible and intangible heritage has been lost. While efforts today are directed towards reconnecting with the past and conserving heritage, including the restoration of the old quarter of Fareej Kanoo in Manama, there lies a caution for sustaining this heritage beyond the purposes of satisfying the presentation of Bahrain on the world stage.

MarEA, through its systematic documentation of MCH across MENA, is building a unique record of its extent and condition, a record that is valuable for commercial and governmental development, which at the very least exists in digital perpetuity beyond any factor that might destroy MCH's physical remains. Nonetheless, MarEA's concern extends beyond documentation to promoting, through dialogue, collaboration and co-production, the preservation and protection of the entirety of the MCH resource. This is only achieved by reconciling the value of heritage, internationally and locally. On the international stage, cultural heritage with Outstanding Universal Value demonstrated through its exceptional significance, may, according to criteria set out by UNESCO, i.e. sites that bear unique testimony to a cultural tradition, be granted World Heritage Status.⁷¹ Such designations, be it through the World Heritage List or other international and national conventions, work towards site protection and preservation. However, locally, cultural heritage holds a social value as '*a collective attachment to a place that embodies meanings and values that are important to a community or communities*'⁷²; it holds value in the construction of identity, and in contributing to peace and reconciliation.⁷³ Cultural heritage sustainability is only possible when what is of value to a community, to society, is truly recognised, and when development plans and urban agendas (e.g., the New Urban Agenda published in 2017 detailing standards for future urban development⁷⁴) are fabricated with community integration and involvement. For example, Argyropoulos and Stratigea while discussing MCH in the Mediterranean raise the issue of a mono-disciplinary, siloed approach and consideration of MCH that lacks a '*substantial link to society*'.⁷⁵ To overcome this, an integration of the various interpretations and perceptions of MCH, along with building multi and interdisciplinary cooperation, is required, which in turn fosters stronger grounds for MCH's sustainability.⁷⁶ This is particularly important in light of the UN Decade of Ocean Science for Sustainable Development 2021–2030 initiative in which the role and value of MCH is becoming more visible through the effort of the Ocean Decade Heritage Network.⁷⁷ In this regard, MarEA works towards forming further collaborations with departments of antiquities (DoAs) in the MENA region, with regional and local experts and initiatives, as well as developing adaptable toolkits that address local MCH needs.⁷⁸

Finally, despite the irreversible loss to the MCH resource from growing urbanisation in the maritime zone, its identification and documentation across the MENA region is a much-needed stepping stone, which along with a recognition of its value (international, regional, and local) and its multi-perceptions (individuals, local and international communities, DoAs, tourism sector, researchers, etc.), can facilitate its integration into sustainable urban and marine spatial planning agendas. A critical key to this success is a commitment to inclusivity on the level of decision making, and to addressing the disparity in planning, actual implementation, and upkeep of the MCH resource.

Notes

1. Dawson, "Coastal Heritage, Global Climate".
2. Bailey and Flemming, "Archaeology of Continental Shelf"; Safadi and Sturt, "Warped Sea of Sailing"; Leidwanger and Knappett, *Maritime Networks Ancient Mediterranean*.
3. United Nations, *Ocean Conference 2017 Factsheet*.
4. McGranahan, Balk and Anderson, "Rising Tide Climate Change"; Small and Nicolls, "Global Analysis Human Settlement".
5. Henderson, "Oceans Without History"; Papageorgiou, "Challenges for Underwater Heritage"; Vallega, "Coastal Cultural Heritage Management".
6. World Bank, *World Development Indicators*; Madbouly, *Revisiting urban planning*.
7. Steiner and Wippel, "Urban development Deconstructing Visions".
8. Beier, "Worlding Cities in Middle East".
9. Heeg, "Neoliberalism and Neoliberalization".
10. El-Sheshtawy, *Planning Middle Eastern Cities*.
11. Sari, "Increasing Urbanisation and Pollution"; El-Sheshtawy, *Planning Middle Eastern Cities*, 19.
12. Elgendy and Abaza, *Urbanisation in MENA Region*.
13. Cuttler et al., "Qatar National Historic Record".
14. Casana and Laugier, "Satellite Imagery-Based Monitoring"; Rayne et al., "Geospatial Methods for Endangered Archaeology"; Rayne et al., "Change Detection Archaeological Sites".
15. Andreou et al., "Maritime Endangered Archaeology".
16. Rayne et al., "Geospatial Methods for Endangered Archaeology".
17. Sturt et al., "Next Frontiers Submerged Landscapes".
18. Lambeck and Purcell, "Sea-Level Change Mediterranean"; Erlandson, *Archaeology of Aquatic Adaptations*; Erlandson and Fitzpatrick, "Oceans Islands and Coasts".
19. Westley et al., "Climate Change and Coastal Archaeology".
20. Seto et al., "Analysis of Global Urban Expansion".
21. See above 19.
22. Crofts et al., *Definition of the CIDOC*.
23. Disturbances relating to natural pressures such as coastal erosion and wave and wind action were omitted here so as to highlight anthropogenic impacts. Unknown disturbances relate to those that cannot be identified by MarEA researchers analysing and creating the assessment records. These were also removed from this evaluation.
24. The density mapping is only relevant to MarEA documented sites, which to this date covers the countries of Syria, Lebanon, Egypt, Jordan, Libya, Sudan, Yemen, Oman, UAE, and Bahrain.
25. Buchhorn et al., *Copernicus Global Land Service*.
26. World Bank, *Egypt, Promoting Poverty Reduction*.
27. Hzami et al., "Coastal Vulnerability North Africa", 11.
28. Frihy, "Morphodynamic Implications Western Egypt", 1178.
29. Hereher, "Coastal Vulnerability Assessment for Egypt", 347; Frihy, "Morphodynamic Implications Western Egypt"; also reported in antiquity, e.g. Diodorus Siculus I, xxx, 31.
30. Embabi, *Landscapes and Landforms of Egypt*, 273-4; White, "Excavations on Bates's Island", 58; White and White, "Coastal sites of northeast Africa".
31. Bates, "Notes from Marsa Matruh", 717; Bates, "Excavations at Marsa Matruh", 126.
32. Sarhan, *Socioeconomic Assessment Matrouh*, 7-8.
33. El Raey and Mohamed, "Sea Level Marsa Matrouh", 2.
34. Elbeih, Elkafrawy and Attia, "Ports in the Northwestern Egypt", 310.
35. Bates, "Excavations at Marsa Matruh"; Hulin, "Marsa Matruh revisited"; White, "Marsa Matrouh Ancient Paraetionium"; White, *Marsa Matruh I*.
36. Goodchild, "Byzantine Chapel Marsa Matruh", 211 n.38; White, *Marsa Matruh I*, 10-1 n.10-1.
37. Fourtau, "Cote de la Marmarique"; Bates, "Excavations at Marsa Matruh"; Hulin and White, "A Final Summary of Evidence", 179; see also White, *Marsa Matruh I*, 7, 13 n.50.
38. Bates, "Excavations at Marsa Matruh"; Fourtau, "Cote de la Marmarique"; White, *Marsa Matruh I*, 3.

39. White, "Excavations on Bates's Island", 58; White and Gardner, "Environmental Morphology Island and Lagoon", 23-4.
40. Bates, "Excavations at Marsa Matruh"; Fourtau, "Cote de la Marmarique".
41. Bates, "Excavations at Marsa Matruh", 131; White, "Excavations on Bates's Island", 58; Cassius Dio LI, 9.
42. Hulin and White, "A Final Summary of Evidence", 185, n.133.
43. Mattingly, "Map 73 Ammon".
44. Pappalardo and La Rosa, "Planning Policies Case of Egypt"; Youssef, *National Plan for Urban Development*.
45. Honour Frost Foundation, *NW Egyptian Marmarica Survey*.
46. Maclean and Insoll, *Archaeological Guide to Bahrain*, 1.
47. World Bank, *World Development Indicators*.
48. United Nations, *World Population Prospects*.
49. Al-Mohannadi and Furlan, "City Planning in the Gulf", 140; Al-Nabi, *History Land Use Bahrain*.
50. Al-Nabi, *History Land Use Bahrain*, 75.
51. *Ibid.*, 84.
52. Maclean and Insoll, *Archaeological Guide to Bahrain*.
53. Bu Maher Fort, Muharraq.
54. Alraouf, "Rehabilitation of Muharraq Centre"; Fuccaro, "Urban History of Bahrain".
55. Pedersen, "Survey for Shipwrecks Bahrain".
56. Shubbar and Raffaello, "Traditional Neighborhood Manama City".
57. *Ibid.*, 111.
58. Urban Planning Authority, *Bahrain National Plan*.
59. Battis, *Pearling Economy Manama*. UNESCO, *Pearling Economy Bahrain*.
60. Ives et al., "Infrastructure Investments"; World Tourism Organization, *Tourism in the MENA Region*.
61. Bromber et al., "The Arab(ian) Gulf: Urban Development".
62. Ibrahim, "Post-Revolutionary Urban Egypt", 239.
63. *Ibid.*, 242.
64. *Ibid.*, 255-7.
65. *Ibid.*, 257.
66. See above 44.
67. Rudolff, *Pearling Island Economy*.
68. Al Sayeh, "Bahrain: On History", 266.
69. *Ibid.*, 273.
70. *Ibid.*, 274-80.
71. UNESCO Heritage Committee, *Implementation of Heritage Convention*, 20-1.
72. Jones, "Social Value of Heritage", 22.
73. Silverman, "Contested Cultural Heritage".
74. ElSheshtawy, *Sultans of Green*.
75. Argyropoulos and Stratigea, "Management of Underwater Cultural Heritage", 1597.
76. Nutley, "Underwater Cultural Heritage Interpretation".
77. United Nations, *The 2030 Agenda*; Trakadas et al., "Ocean Decade Heritage Network".
78. Breen et al., "Integrating Cultural and Natural Heritage".

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Bibliography

- Al Sayeh, N. "Bahrain: On History, Coastlines, Renders, and the Image of Public Space." In *Gulf Cities as Interfaces*, edited by G. Katodrytis and S. Syed, 265–282. Cambridge: Gulf Research Centre Cambridge, 2014.
- Al-Mohannadi, and A. Furlan. "The Practice of City Planning and Design in the Gulf Region: The Case of Abu Dhabi, Doha and Manama." *International Journal of Architectural Research* 12, no. 2 (2018): 126–145.
- Alraouf, A. "The Rehabilitation of the Muharraq Historical Center, Bahrain: A Critical Narrative." In *Cultural Heritage in the Arabian Peninsula, Debates, Discourses and Practices*, edited by E. Karen and R. Trinidad, 172–188. London: Routledge, 2014.
- Andreou, G. *Archaeology and Climate Change: New Challenges to Fieldwork in the Middle East*, 2020. Available from Accessed January 30, 2021. <https://land.copernicus.eu/global/index.html>. Accessed 1 August 2021.
- Andreou, G., L. Blue, C. Breen, C. Safadi, H. O. Huigens, J. Nikolaus, and K. Westley. "Maritime Endangered Archaeology of the Middle East and North Africa: The MarEA Project." *Antiquity* 94 (2021): 1–7.
- Argyropoulos, V., and A. Stratigea. "Sustainable Management of Underwater Cultural Heritage: The Route from Discovery to Engagement- Open Issues in the Mediterranean." *Heritage* 2, no. 2 (2019): 1588–1613. doi:10.3390/heritage2020098.
- Bailey, G., and N. Flemming. "Archaeology of the Continental Shelf: Marine Resources, Submerged Landscapes and Underwater Archaeology." *Quaternary Science Reviews* 27, no. 23–24 (2008): 2153–2165. doi:10.1016/j.quascirev.2008.08.012.
- Bates, O. "Ethnographic Notes from Marsa Matruh." *The Journal of the Royal Asiatic Society of Great Britain and Ireland* 47, no. 4 (1915): 717–739. doi:10.1017/S0035869X00048802.
- Bates, O. "Excavations at Marsa Matruh." *Harvard African Studies* 8 (1927): 124–200.
- Battis, E. *Management Plan for the Testimony of the Pearling Economy*. Manama, Bahrain: Ministry of Culture and Education, 2005.
- Beier, R. "Worlding Cities in the Middle East and North Africa- Arguments for a Conceptual Turn." *Middle East-Topics and Arguments* 12 (2019): 28–34.
- Breen, C., C. Safadi, H. Huigens, S. Tews, K. Westley, G. Andreou, R. Ortiz-Vasquez, J. Nikolaus, and L. Blue. "Integrating Cultural and Natural Heritage Approaches to Marine Protected Areas in the MENA Region." *Marine Policy* 132 (2021): 104676. doi:10.1016/j.marpol.2021.104676.
- Bromber, K., B. Krawietz, C. Steiner, and S. Wippel. "The Arab(ian) Gulf: Urban Development in the Making." In *Under Construction: Logics of Urbanism in the Gulf Region*, edited by S. Wippel, K. Bromber, C. Steiner, and B. Krawietz, 1–17. Farnham: Ashgate, 2014.
- Buchhorn, M., B. Smets, L. Bertels, M. Lesiv, N.-E. Tsendbazar, D. Masiliunas, L. Linlin, M. Herold, and S. Fritz. *Copernicus Global Land Service: Land Cover 100m: Collection 3: epoch 2019: Globe* (Version V3.0.1) [Land cover]. Accessed January 30, 2021. <https://land.copernicus.eu/global/index.html>
- Carter, R., M. Morley, and C. Morse. *Bu Maher Fort, Muharraq. Report on Excavations in 2010 for the Ministry of Culture and Information, Bahrain*. Oxford: Oxford Brookes Archaeology and Heritage, 2011.
- Casana, J., E. J. Laugier, and P. F. Biehl. "Satellite Imagery-Based Monitoring of Archaeological Site Damage in the Syrian Civil War." *PLOS ONE* 12, no. 11 (2017): e0188589. doi:10.1371/journal.pone.0188589.
- Crofts, N., M. Doerr, T. Gill, S. Stead, and M. Stiff, eds. *Definition of the CIDOC Conceptual Reference Model*. ICOM/CRM Special Interest Group, 2008. https://cidoc-crm.org/sites/default/files/CIDOC%20CRM_v6.2.9%2030-4-2020%20.pdf

- Cuttler, R., T. W. W. Tonner, F. A. Al-Naimi, L. M. Dingwall, and N. Al-Hemaidi. "The Qatar National Historic Environment Record: A Platform for the Development of a fully-integrated Cultural Heritage Management Application." *ISPRS Annals of the Photogrammetry, Remote Sensing and Spatial Information Sciences* II-5, no. W1 (2013): 85–90.
- Dawson, T., J. Hambly, A. Kelley, W. Lees, and S. Miller. "Coastal Heritage, Global Climate, Public Engagement, and Citizen Science." *Proceedings of the National Academy of Sciences of the United States of America* 117, 15, 8280–8286, 2020.
- El Raey, M., and W. Mohamed. "Spatial Approach for Sea Level Rise Impacts on Marsa Matrouh City – Egypt." *Proceedings of the Earth Observation and Geoinformation Sciences in Support of Africa's Development*, Cairo, Egypt, 30/10–2/11, 1–10, 2006.
- El-Sheshtawy, Y. *Planning Middle Eastern Cities. An Urban Kaleidoscope in a Globalising World*. London: Routledge, 2004.
- Elbeih, S. F., S. B. Elkafrawy, and W. Attia. "Multi-criteria Site Selection and Assessment of Ports in the Northwestern Coast of Egypt: A Remote Sensing and GIS Approach." *International Journal of Environmental Science and Development* 10, no. 10 (2019): 310–320. doi:10.18178/ijesd.2019.10.10.1192.
- Elgendy, K., and N. Abaza. *Urbanization in the MENA region: A Benefit or a Curse*. Friedrich-Ebert-Stiftung, Department for Middle East and North Africa, 2020. Accessed April 24, 2021. <https://mena.fes.de/press/e/urbanization-in-the-mena-region-a-benefit-or-a-curse>
- ElSheshtawy, Y. *Sultans of Green. Arab Gulf Cities and the New Urban Agenda*. Dubaization. Reflections on architecture & urbanism, inspired by Dubai, 2018. Accessed June 1, 2021. <https://dubaization.com/post/176821563973/the-sultans-of-green-arab-gulf-cities-and-the-new>
- Embabi, N. S. *Landscapes and Landforms of Egypt. Landforms and Evolution*. Cham: Springer International Publishing, 2018.
- Erlandson, J. M. "The Archaeology of Aquatic Adaptations: Paradigms for a New Millennium." *Journal of Archaeological Research* 9 (2001): 287–350. doi:10.1023/A:1013062712695.
- Erlandson, J. M., and S. M. Fitzpatrick. "Oceans, Islands, and Coasts: Current Perspectives on the Role of the Sea in Human Prehistory." *Journal of Island and Coastal Archaeology* 1 (2006): 5–32. doi:10.1080/15564890600639504.
- Fourtau, L. "La cote de la Marmarique d'après les anciens géographies grecs." *Bulletin de L'Institut Égyptien* 8 (1914): 114–121.
- Frihy, O. E. "Morphodynamic Implications for Shoreline Management of the western-Mediterranean Sector of Egypt." *Environmental Geology* 58, no. 6 (2009): 1177–1189. doi:10.1007/s00254-008-1595-3.
- Fuccaro, N. "Understanding the Urban History of Bahrain." *Critique: Critical Middle Eastern Studies* 9, no. 17 (2000): 49–81.
- Goodchild, R. G. "A Byzantine Chapel at Marsa Matruh (Paraitonium)." *Journal of the American Research Center in Egypt* 28 (1991): 201–211. doi:10.2307/40000580.
- Heeg, S. "Neoliberalism and Neoliberalization: Helpful Devices for the Analysis of Urban Development in the Middle East and North Africa." *Middle East-Topics and Arguments* 12 (2019): 18–27.
- Henderson, J. "Oceans without History? Marine Cultural Heritage and the Sustainable Development Agenda." *Sustainability* 11 (2019): 5080. doi:10.3390/su11185080.
- Hereher, M. E. "Coastal Vulnerability Assessment for Egypt's Mediterranean Coast." *Geomatics, Natural Hazards and Risk* 6, no. 4 (2015): 342–355. doi:10.1080/19475705.2013.845115.
- Honor Frost Foundation. *NW Egyptian Marmarica Coast Survey*. Accessed August 1, 2021. <https://honorfrostfoundation.org/2021/08/05/nw-egyptian-marmarica-coast-survey-ongoing/>
- Hulin, L. "Marsa Matruh Revisited: Modelling Interaction at a Late Bronze Age Harbour on the Egyptian Coast." In *Stories of Globalisation: The Red Sea and the Persian Gulf from Late Prehistory to Early Modernity*, edited by A. Manzo, C. Zazzaro, and D. J. De Falco, 53–64. Leiden: Brill, 2018.
- Hulin, L., and D. White. "A Final Summary of the Evidence." In *Marsa Matruh II: The Objects (Prehistory Monographs, 2)*, edited by D. White, 169–185. Philadelphia: INSTAP, 2002.

- Hzami, A., E. Heggy, O. Amrouni, G. Mahé, M. Maanan, and S. Abdeljaouad. "Alarming Coastal Vulnerability of the Deltaic and Sandy Beaches of North Africa." *Scientific Reports* 11, no. 2320 (2021): 1–15. doi:10.1038/s41598-020-77926-x.
- Ibrahim, K. "Post-Revolutionary Urban Egypt: A New Mode of Practice?" *Égypte/Monde arabe* 11 (2014): 237–266. doi:10.4000/ema.3330.
- Ives, D., M. M. Hoscheidt, B. Jaeger, and J. S. Tocchetto. "Infrastructure Investments in the Middle East and North Africa." *UFRGS Model United Nations Journal* 1 (2013): 308–362.
- Jones, S. "Wrestling with the Social Value of Heritage: Problems, Dilemmas and Opportunities." *Journal of Community Archaeology & Heritage* 4, no. 2 (2017): 21–37. doi:10.1080/20518196.2016.1193996.
- Lambeck, K., and A. Purcell. "Sea-level Change in the Mediterranean Sea since the LGM: Model Predictions for Tectonically Stable Areas." *Quaternary Science Reviews* 24 (2005): 1969–1988. doi:10.1016/j.quascirev.2004.06.025.
- Leidwanger, J., and C. Knappett. *Maritime Networks in the Ancient Mediterranean World*. Cambridge: Cambridge University Press, 2018.
- Maclean, R., and T. Insoll. *An Archaeological Guide to Bahrain*. Oxford: Archaeopress, 2011.
- Madbouly, M. *Revisiting urban planning in the Middle East and North Africa Region. Regional study prepared for Revisiting Urban Planning: Global Report on Human Settlements*, 2009. Accessed February 12, 2021. https://unhabitat.org/sites/default/files/2010/07/GRHS.2009.Regional.MENA_.pdf
- Mattingly, D. J. "Map 73 Ammon." In *Barrington Atlas of the Greek and Roman World*, edited by J. A. Talbert and R. S. Bagnall, 1108–1116, Princeton: Princeton University Press, 1996.
- McGranahan, G., D. Balk, and B. Anderson. "The Rising Tide: Assessing the Risks of Climate Change and Human Settlements in Low Elevation Coastal Zones." *Environment and Urbanization* 19 (2007): 17–3. doi:10.1177/0956247807076960.
- Noor Al-Nabi, M. *The History of Land Use and Development in Bahrain*. Vols. 1–345. Manama, Bahrain: Information Affairs Authority, 2012.
- Nutley, D. M. "Look Outwards, Reach Inwards, Pass It On: The Three Tenures of Underwater Cultural Heritage Interpretation." In *Out of the Blue. Public Interpretation of Maritime Cultural Resources*, edited by J. H. Jameson and D. A. Scott-Ireton, 33–51. Boston: Springer, 2007.
- Papageorgiou, M. "Stakes and Challenges for Underwater Cultural Heritage in the Era of Blue Growth and the Role of Spatial Planning: Implications and Prospects in Greece." *Heritage* 2, no. 2 (2019): 1060–1069. doi:10.3390/heritage2020069.
- Pappalardo, V., and D. La Rosa. "Planning Policies and Instruments for Sustainability and Resilience in Mediterranean Contexts. The Case of Egypt." *Sustainable Mediterranean Construction, Special Issue 4: Landscapes at Risk* 1 (2020): 41–44.
- Pedersen, R. K. "A Survey for Shipwrecks, Submerged Settlements and Seafaring Technology in Bahrain." In *Shipwrecks around the World: Revelations of the Past*, edited by S. Tripathi, 1–20. New York: Kaveri Books, 2015.
- Rayne, L., J. Bradbury, D. Mattingly, G. Philip, R. Bewley, and A. Wilson. "From above and on the Ground: Geospatial Methods for Recording Endangered Archaeology in the Middle East and North Africa." *Geosciences* 7, no. 4 (2017): 100. doi:10.3390/geosciences7040100.
- Rayne, L., M. C. Gatto, L. Abdulaati, M. Al-Haddad, M. Sterry, N. Sheldrick, and D. Mattingly. "Detecting Change at Archaeological Sites in North Africa Using Open-Source Satellite Imagery." *Remote Sensing* 12, no. 22 (2020): 3694. doi:10.3390/rs12223694.
- Rudolff, B. *Pearling, Testimony of an Island Economy*. Nomination File for the UNESCO World Heritage List. Manama, Ministry of Culture and Information, 2010.
- Safadi, C., and F. Sturt. "The Warped Sea of Sailing: Maritime Topographies of Space and Time for the Bronze Age Eastern Mediterranean." *Journal of Archaeological Science* 103 (2019): 1–15. doi:10.1016/j.jas.2019.01.001.
- Sarhan, M. *The Socioeconomic Assessment for Siwa Oasis, Red Sea, Matrouh in Egypt*. Cairo: United Nations Development Programme, 2013.

- Sari, D. "Increasing Urbanisation and Pollution in the MENA Region: Causes of Conflicts?" In *Security and Environment in the Mediterranean*, edited by H. G. Brauch, P.H. Liotta, A. Marquina, P.F. Rogers, and M. El-Sayed Selim, 843–860. Berlin: Springer, 1999.
- Seto, K. C., M. Fragkias, B. Güneralp, M. K. Reilly, and J. A. Añel. "A Meta-Analysis of Global Urban Land Expansion." *PLoS ONE* 6, no. 8 (2011): e23777. doi:10.1371/journal.pone.0023777.
- Shubbar, F., and F. Raffaello. "Kanoo', a Traditional Urban Neighborhood in Manama City: An Approach to Promote Urban Regeneration and Enhance Livability." *Saudi Journal of Civil Engineering* 3, no. 5 (2019): 105–121. doi:10.36348/SJCE.2019.v03i05.003.
- Silverman, H. "Contested Cultural Heritage: A Selective Historiography." In *Contested Cultural Heritage: Religion, Nationalism, Erasure, and Exclusion in a Global World*, edited by H. Silverman, 1–49. New York: Springer, 2011.
- Small, C., and R. J. Nicholls. "A Global Analysis of Human Settlement in Coastal Zones." *Journal of Coastal Research* 19 (2003): 584–599.
- Steiner, C., and S. Wippel. "Urban Development in the Middle East and North Africa: Deconstructing Visions, Politics and Identities." *Middle East-Topics and Arguments* 12 (2019): 5–17.
- Sturt, F., N. C. Flemming, D. Carabias, H. Jöns, and J. Adams. "The Next Frontiers in Research on Submerged Prehistoric Sites and Landscapes on the Continental Shelf". *Proceedings of the Geologists Association*, 129, no. 5 (2018): 654–683.
- Trakadas, A., A. Firth, D. Gregory, D. Elkin, U. Guerin, J. Henderson, J. Kimura, et al. "The Ocean Decade Heritage Network: Integrating Cultural Heritage within the UN Decade of Ocean Science 2021-2030." *Journal of Maritime Archaeology* 14 (2019): 153–165. doi:10.1007/s11457-019-09241-0.
- UNESCO. *Pearling, Testimony of an Island Economy Bahrain*. Accessed July 25, 2021. <https://whc.unesco.org/en/list/1364/>
- UNESCO World Heritage Committee. *Operational Guidelines for the Implementation of the World Heritage Convention*. Paris: World Heritage Centre, 2021.
- United Nations. *The Ocean conference 2017 Factsheet: People and Oceans*. Accessed February 1, 2021a. <https://www.un.org/sustainabledevelopment/wp-content/uploads/2017/05/Ocean-factsheet-package.pdf>
- United Nations. *Transforming Our World: The 2030 Agenda for Sustainable Development*. Accessed May 20, 2021b. https://www.un.org/ga/search/view_doc.asp?symbol=A/RES/70/1&Lang=E
- United Nations, Department of Economic and Social Affairs. *World Population Prospects 2019 Data Booklet*. Accessed August 1, 2021. https://population.un.org/wpp/Publications/Files/WPP2019_DataBooklet.pdf
- Urban Planning & Development Authority. *Bahrain National Detail Land Use Plan. The Ten Strategies*. Accessed July 3. <https://upda.gov.bh/en/category/the-ten-strategies>
- Vallega, A. "The Coastal Cultural Heritage Facing Coastal Management." *Journal of Cultural Heritage* 4, no. 1 (2003): 5–24. doi:10.1016/S1296-2074(03)00004-9.
- Westley, K., G. Andreou, C. Safadi, H. Huigens, J. Nikolaus, R. Ortiz-Vasquez, N. Ray, et al. "Climate Change and Coastal Archaeology in the Middle East and North Africa: Assessing past Impacts and Future Threats." *Journal of Island and Coastal Archaeology* (2021): 1–33. doi:10.1080/15564894.2021.1955778.
- White, D. "Excavations on Bates's Island, Marsa Matruh." *Journal of the American Research Center in Egypt* 23 (1986): 51–84. doi:10.2307/40001090.
- White, D. "Marsa Matruh: The Resurfacing of Ancient Paraetionium and Its Ongoing Reburial." In *Archaeological Research in Roman Egypt (JRA Supplementary Series, 19)*, edited by D. M. Bailey, 61–81. London: Ann Arbor, 1996.
- White, D. *Marsa Matruh I: The Excavation*. (Prehistory Monographs, 1). Philadelphia: INSTAP, 2002.
- White, D., and R. Gardner. "Environmental Morphology and History of the Island and Adjacent Lagoon Area." In *Marsa Matruh I: The Excavation*, edited by D. White, 23–34. Philadelphia: INSTAP, 2002.
- White, D., and A. P. White. "Coastal Sites of Northeast Africa: The Case against Bronze Age Ports." *Journal of the American Research Center in Egypt* 33 (1996): 11–30. doi:10.2307/40000602.
- The World Bank. *World Development Indicators: Urban population (% of total population)*. Accessed February 1, 2021. <https://data.worldbank.org/indicator/SP.URB.TOTL.IN.ZS?locations=ZQ>

World Bank. *Egypt, Promoting Poverty Reduction and Shared Prosperity a Systematic Country Diagnostic*. Washington DC: World Bank, 2015.

World Tourism Organization. "Tourism in the MENA Region, UNWTO." *Madrid* (2019). doi:[10.18111/9789284420896](https://doi.org/10.18111/9789284420896).

Youssef, A. E. *National Strategic Plan for Urban Development - Vision 2052, and Sustainable Development Goals – SDGs Investigating Features of Alignment*. Technical Report submitted to the Planning, Communications, and Reporting Unit - UNDP Egypt Country office. United Nations Development Programme, 2017.