

Impact of Land Use Change on Archaeological Sites In Jordan and Saudi Arabia

Mahmoud Ali Alsubeh

Urban and regional planning department, Faculty of architecture and planning
King Abdul Aziz University, Kingdom of Saudi Arabia
malsubeh@kau.edu.sa

Abstract

The world population is rapidly increasing, and accordingly, the urban expansion case is also increasing. This expansion has a negative impact on land use and archaeological sites. Saudi Arabia and Jordan faced the same problem of land-use change and destroy some archeological sites by changing their features. After studying the population growth and the size of urbanization, it was noticed that the size of land-use change and the impact on archaeological sites was not fully elaborated in the literature. The results of this study concluded that the institutional weaknesses accelerate the damaging actions toward the archeological sites in both Jordan and Saudi Arabia.

Systems of governance were unable to safeguard cultural heritage or did not have a clear plan to address negative impacts for urbanization expansion. The models have enabled the extraction of some points overlooked by governments such as non-observance of the specificities of the urban area, and the inadequacy of these residential projects for the lifestyle of the archaeological area.

The study reached some recommendations for the success of new housing projects in the region, which require those housing projects and other projects to be planned according to the design criteria of the urban fabric of the region. Also, the distribution of land use so that the preservation of heritage sites and the surrounding area of calm and privacy. In addition, laws must be issued to prevent the owners of archaeological houses from removing their archaeological property to preserve them.

Keywords: Urban Growth, Land Use Change, Archaeological Sites, Heritage Sites.

Introduction

The population of the world is rapidly increasing. Where, the world population in 2017 is 7.6 billion and expected to reach; 8.6 billion in 2030, 9.8 billion in 2050 and 11.2 billion in 2100, according to a new United Nations report being launched 21 June 2017, almost 83 million people are added to the world's population every year. This increases urban expansion as it is one of the most affected sectors. The rapid growth in global urban is likely to continue as long as urban populations and incomes continue to grow, and as long as urban transport remains relatively cheap and affordable (Shlomo Angel and others, 2011).

Moreover, the area used up by cities amounted to some 3% of the land, estimated at 14 million square kilometers in 2000 (World Bank, 2005). "Cities are now expected to grow 2.5 times in area by 2030, consuming some 1 million square kilometers, or 1.1% of the total land area of countries.

They may possibly consume as much as 5–7% of total arable land, depending on the future rate of expansion of arable land, which is currently 2% per annum" (Stephen and others, 2005).

Urban expansion is by no means a recent phenomenon, but negative impacts are largely begun shown recently. Here, attention has begun to regulate this phenomenon in the 16th century, like London and New York, in 1580 and 1811, respectively (Lai, Richard Tseng-Yu, 1988).

As we shall show, the impact of urban expansion also appeared on archeological sites (Mehrdad Hejazi, 2008). Therefore, this impact is not limited to the physical aspect but also to the incorporeal side, which means removing the historical spirit from the archaeological site. See (Fig. 1). Despite the global interest in this aspect through Venice Charter, via specified internationally accepted principles of conservation based on the concept of authenticity (Venice Charter, 1964). On the other hand, the lack of control over this expansion in general and in archaeological sites, in particular, has great effects. See (Fig.2 and 3)

On this side, while the urban expansion will still occur in more-developed countries, most of the urban expansion in the coming decades will take place in the developing countries.

This paper, therefore, seeks to refocus the attention of planners, policymakers, and concerned activists in Jordan and Saudi Arabia on urban expansion in these countries and to begin to examine its policy implications upon land use and archaeological sites.



Figure 1. Architectural heritage site Xue Zhai Bridge surrounded by modern houses.
(Source: Yingying Zhang, 2018)



Fig.2. Chahar-Bagh Street, a National Historical Street under the Risk of Underground Transportation Excavations, Isfahan, Iran
(Source: Mehrdad Hejazi, 2008)



(a)



(b)

Fig.3. (a) Old Town – New Town, General View, (b) Destruction at the Traditional Market al-Hal/al-Khayl, Damascus, Syria. (Source: Mehrdad Hejazi, 2008).

Case study

Jordan and Saudi Arabia district located in the Middle East were selected as a case study since it combines both world heritage monuments and rapid growth. (Fig.4). Moreover, monuments and sites in Jordan and Saudi Arabia can be found both in most environments (urban, rural, near sea level, highest mountain-picks of the region, near and far from the coast lines, industrial zones etc.). This rich variety can be used of antiquities Jordan and KSA (Majeed Khan, 2013) (Oxford Business Group,2011), to extract useful and comparative results with respect to urban sprawl and its effects on the monuments of cultural interest and land use, within the same province.

Furthermore, Jordan and KSA is known for the construction boom that started in the 1950s after oil discovery in KSA, Where the level of urbanization rose 15% in 1950 to 81% in 2004 (Nozha Y. al-Jabri, 2008). And waves of refugees in Jordan, where the population density has increased significantly in the Jordan Valley and other areas after the arrival of Palestinian refugees and improved irrigation methods (Maryam Ababsa, 2013). See (Fig. 4). This led to the razing, leveling and demolition processes of old houses and monuments that have private property for giving place to modern luxurious hotels and villas.

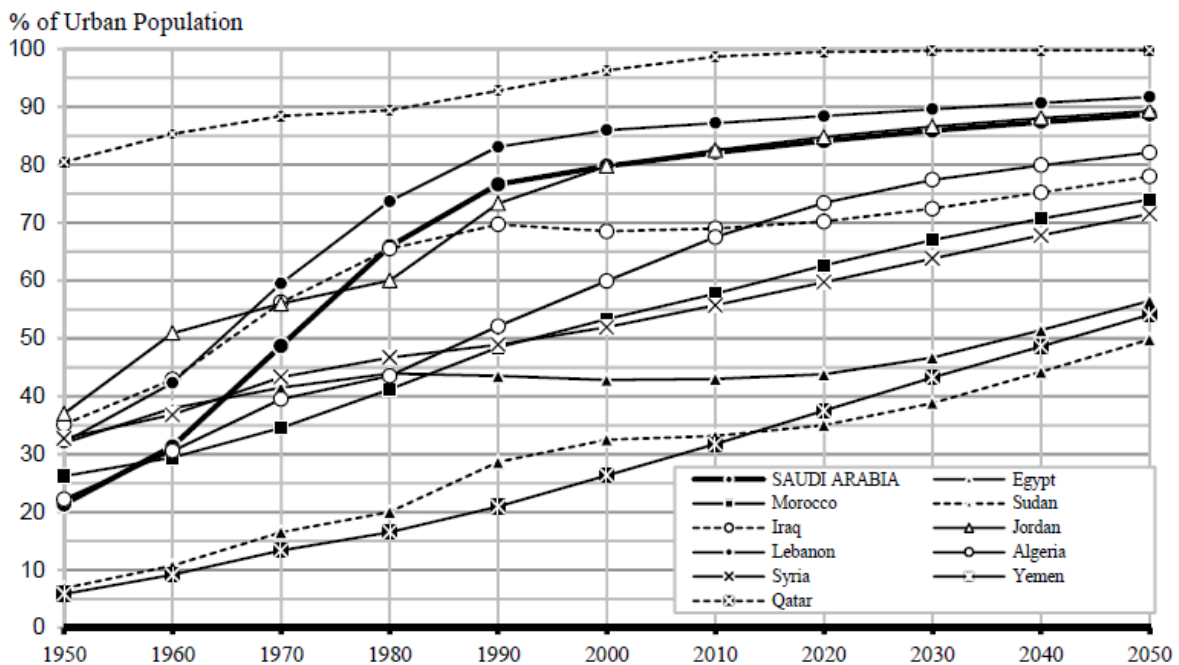


Figure 4. Percentage of urban population in KSA compared to Arab Countries.
(Source: Antar A. Abou-Korin, 2015)

In KSA, the total population in 2018 is 33.4 million (General Authority for statistics, 2018, KSA), while in 1950 it was 3.12 million (World Population Prospects 2017) with increasing 11 times in 7 decades, also indicates a large urban boom. For example in the city of Mecca, the size of urbanization was 180% in the period 1986-2013 (Abdullah F. Alqurashi 2014) and the rest of the cities of the Kingdom in the same direction.

In Jordan, the total population in 1949 is 400,000 people, while in 1950 it was 1.2 million with three times the number before the 1948 war, and two-thirds of Palestinian origin (Jalal Al Hussein and Maryam Ababsa, 2013) and it became 10.3 million in 2018 (The Population Statistics Division, 2018).

Methodology

In this study, the paper relied on following the stages of historical and urban development of target area cite, and its reflection on its morphology (especially the shape or the visual).

The methodology adopted the objectives of this study on the study area during its long life, which is concerned with how the growth of the vertical treatment approaches to follow the upward trend of historical or geographical phenomenon and expansion. The following methods have been followed to achieve the methodology on the one hand and to provide sources of data on the other hand:

A - The office work, which is the reading of previous studies on the region, whether sources or references, as well as publications issued by governments or issued by the competent authorities or the municipality before that.

B - Study maps of the development of the region contained in the references and compare them to each other in order to deepen the scientific knowledge of the researcher of the target area.

C- Studying maps issued by the competent center for the region.

The purpose of the study of these maps was to deepen the knowledge of the stages of the historical and physical development of the two kingdoms, with the aim of reaching a better understanding of the outcome of the interaction between these two developments and drawing a map indicating the limits of the morphological expansion stages resulting from this interaction.

(D) Study of aerial photographs of the two kingdoms previous years, and satellite images from Landsat.

Results and discussion

KSA

Study maps of the development of the region:

When studying the urban expansion maps of the Kingdom of Saudi Arabia. The extent of land use change and degree of expansion have been shown in recent decades (Fig.5 and 6). Which resulted in the reduction of green spaces in contrast to urban expansion. For example, in Riyadh, the area of urban areas doubled within 10 years (1990-2009) (M. T. Rahman, 2016). This was the opposite of vegetation (Abdullah F. Alqurashi and others 2016).

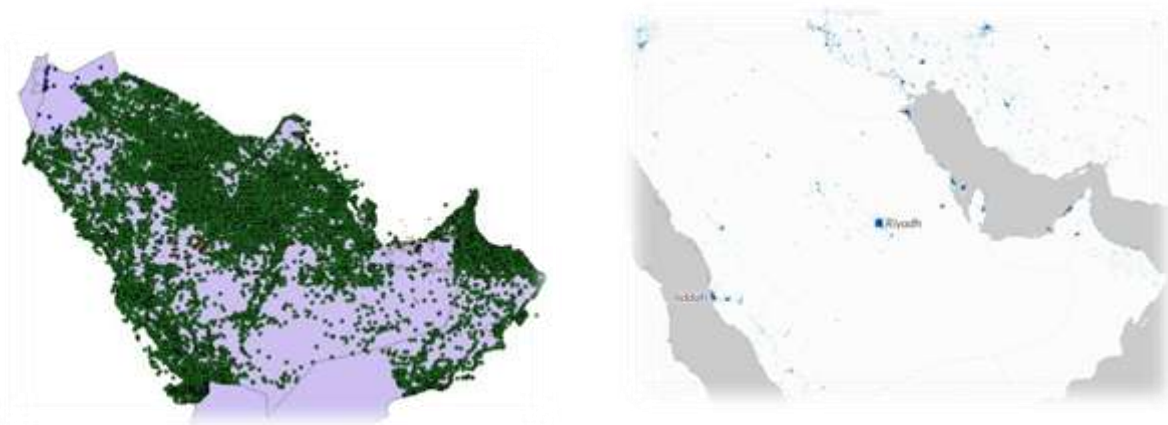


Fig.5. distribution of cities. Source: drawing by researcher



Fig.6. Nightly aerial view of the urban areas of the Arabian Peninsula.

In the years 1985, 1990, 2000, 2007 and 2014, the LULC maps which produced from Landsat images were explained in Figure 6 from A to C for Riyadh, Jeddah and Makkah, respectively as examples in KSA. It is clear that LULC of the respective cities have changed considerably between 1985 and 2014. The most remarkable changes found were in urban areas. The time-series maps of Riyadh city (Figure 7a) show that urban area experienced a gradual expansion from the urban core to the periphery of the city. In Jeddah (Figure 8b), the situation is different, as the shape of the city expansion looks to be determined in the coastline. . Makkah (Figure 7c) has experienced rapid development from the center of the city towards the southern and eastern sectors.

The vegetation cover (croplands) in the southeast of Riyadh in 1985 was of significant intensity, while they decreased over the years between 1985 and 2014. The distributions of the vegetation cover varied in other cities during the change period.

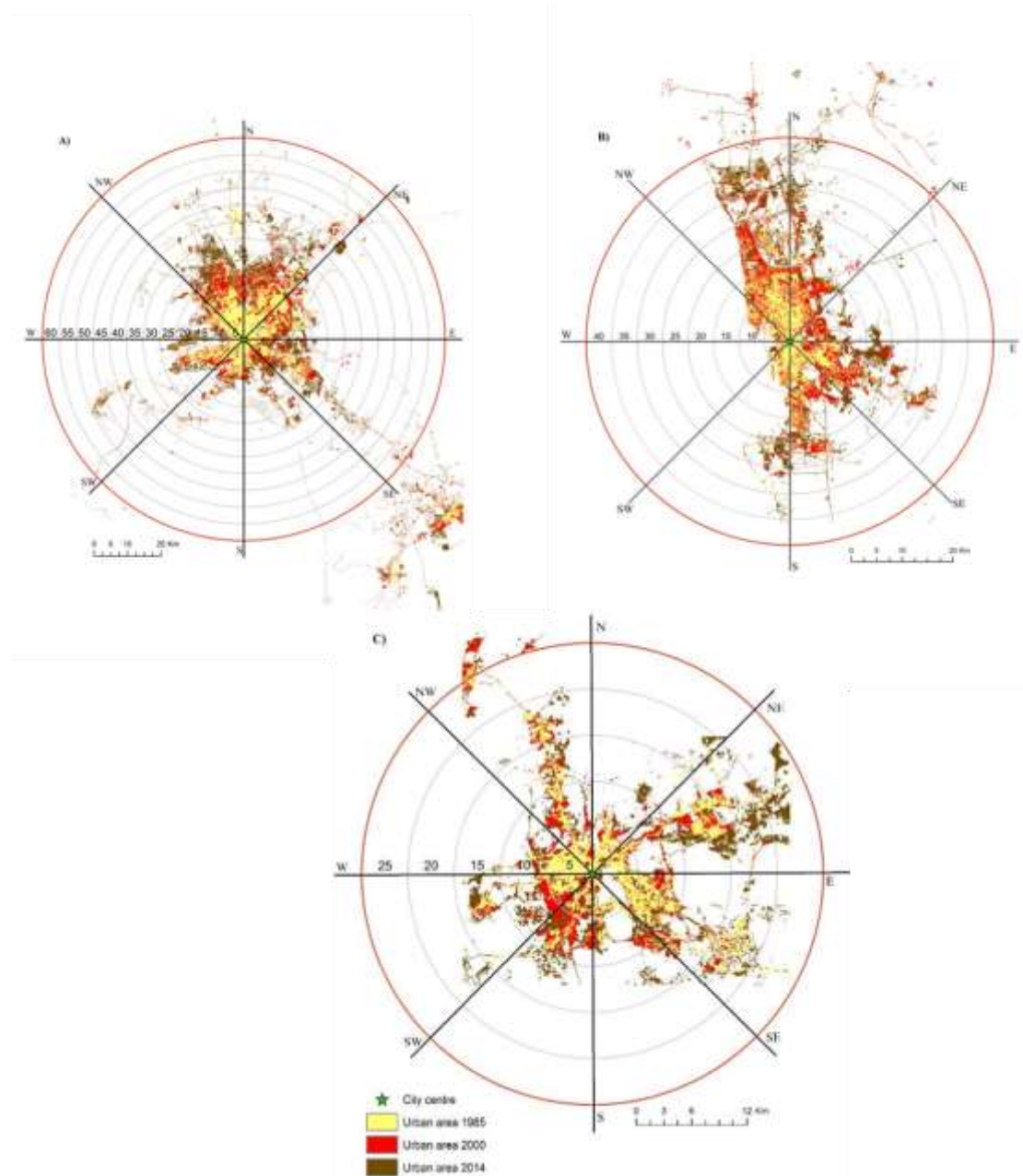


Figure 7. Spatial distribution of LULC changes between 1985 and 2014 in three cities: (A) Riyadh; (B) Jeddah; (C) Makkah. Source: Abdullah F. Alqurashi, (2017).

On another hand, Heritage sites have been heavily affected by this uncontrolled expansion due to economic policies as well as property laws. This led either to the demolition of archaeological buildings under private property or surrounding the archaeological areas with modern architectural aspects and loss the archaeological value for it Fig.8.



Fig.8: distribution of some Heritage sites. Source: drawing by researcher.

In the holy cities of Mecca and Medina, 1400-year-old buildings from the early Islamic period risk being demolished to make way for high-rise buildings for pilgrims. Old markets in Mecca (Fig.9. (a)) were destroyed (Fig.9. (b)) and high-rise towers in the vicinity of Al-Haram mosque are built. These towers have destroyed the authentic view of the mosque from inside (Fig.9.(c)). Covering a 230,000 square meter area adjacent to the Al-Haram mosque, which is considered as the old town. In Medina the same case, old continuous texture of the city has been destroyed and high-rise towers in the vicinity of Prophet's mosque are built. The Prophet's mosque is surrounded by tall hotels and commercial centers and its buffer zone has lost its authenticity (Fig.10.).

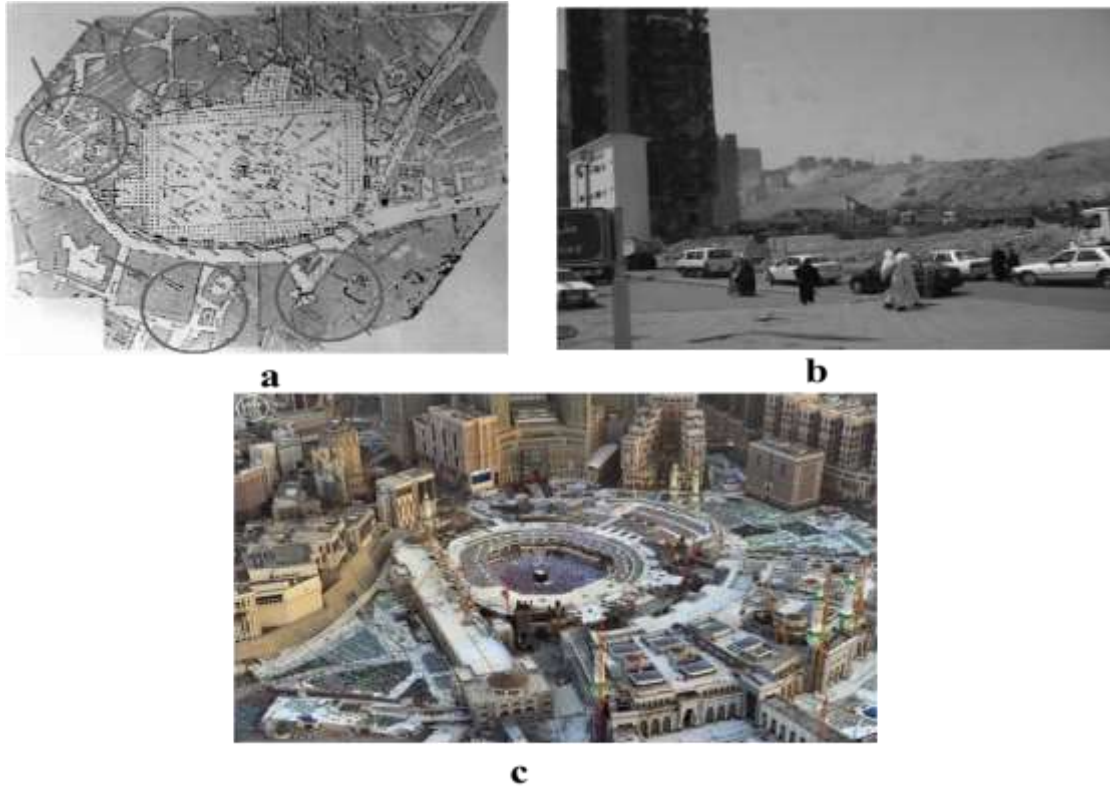


Fig.9. (a) Old markets, (b) Destruction around Al-Haram Mosque, (c) Construction of High-Rise Towers in the Vicinity of Al-Haram Damaging Its Authentic View, Mecca, Saudi Arabia.



Fig.10. High-Rise Buildings Surrounding Prophet's Mosque, Medina, Saudi Arabia

Jordan

Study maps of the development of the region:

When studying the urban expansion maps of the Jordan. The extent of land use change and degree of expansion have been shown in recent decades (Fig.11). Which resulted in the reduction of green spaces in contrast to urban expansion. For example, in Amman, the area of urban areas doubled within 20 years (1983-2005).

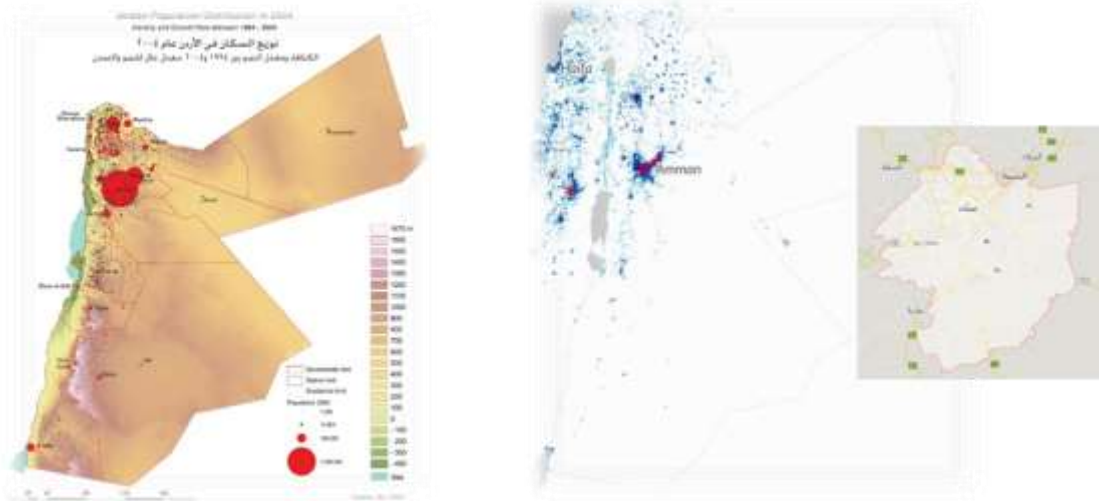


Fig.11. distribution of the Jordanian cities.

The use of land in Jordan is different. In the north, vegetation is increasing, especially in the mountains and surrounding areas, while agriculture and urbanization is increasing in the south. In the east, the land is barren and desert. Moreover, land use in Jordan has changed due to urbanization and construction processes in mountainous areas and dense vegetation areas for beautiful landscapes. Hence the process of land use imbalance (Dawud Al-Eisawi, 2015).

Reference is made to the maps that represent the expansion of the population areas of the Greater Amman Municipality using Landsat satellite images for the years 1983, 1994 and 2005 (Fig. 12 and 13). After comparing the images, it shows that the annual growth rate in the urban area, which was found to be greater than 3%, (land actually built). The built-up area in Amman increased from 72 km² in 1983 to 144 km² in 1994 and 226 km² in 2005. Where, 35% from the area of Greater Amman Municipality (700 km²).

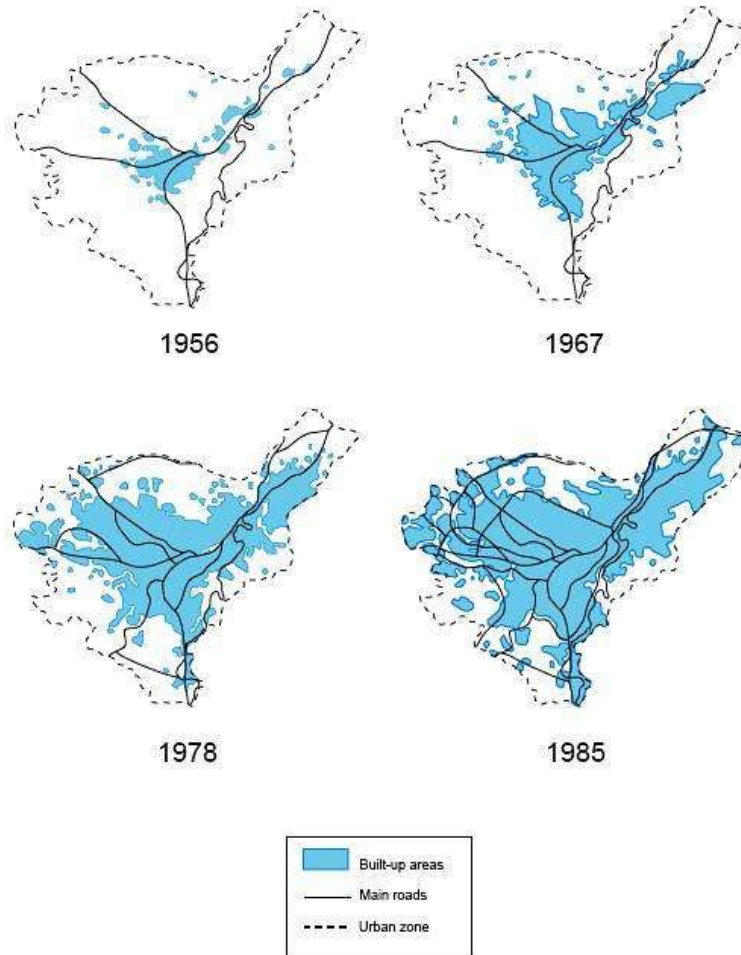


Fig.12. The physical expansion of Amman 1956-1985 (adapted from Amman Municipality, 1987).

Note that the urban expansion of the area depends mainly on the network of main roads and highways. The main arteries along which the sprawl is taking place include, the downtown, Swaileh, Naour. The maps show how land was acquired, converted to urban areas, vegetation and land use changed.

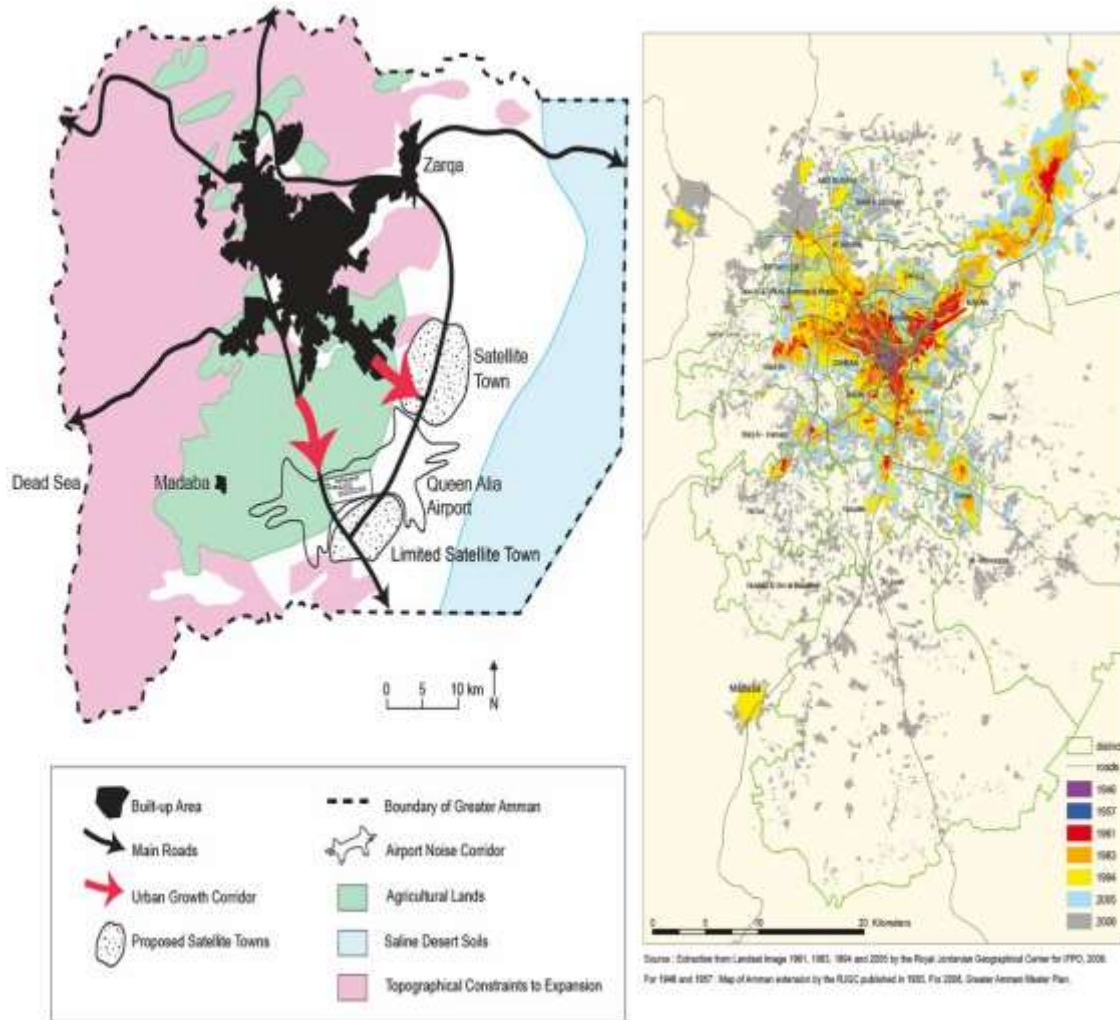


Fig.13. Urban expansion for Greater Amman Municipality (1946-2008).

On another hand, Heritage sites have been heavily affected by this uncontrolled expansion due to economic policies as well as property laws. This led either to the demolition of archaeological buildings under private property or surrounding the archaeological areas with modern architectural aspects and loss the archaeological value for it Fig.14 and 15.



Fig.14. World Heritage Sites in Jordan.

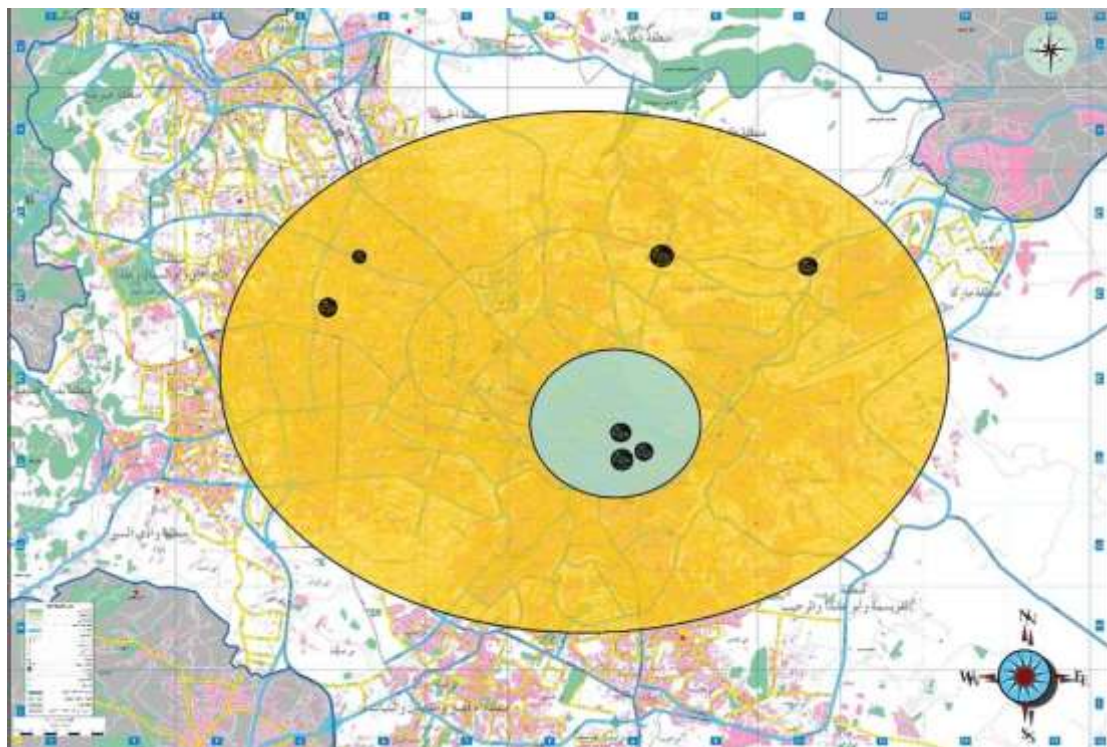


Fig. 15. World Heritage Sites in Greater Amman Municipality with urban expansion.

Conclusion

The paper presents a brief description of the risk of urbanization to cultural heritage and land use in KSA and Jordan. The main categories of risk are economic, social and governmental causes. Through the attempt to establish new projects without taking into account historical sites and their heritage value, different and appropriate measures may be taken to safeguard cultural heritage.

Moreover, the institutional weaknesses accelerate the damaging action of governmental, economic and social factors. Systems of governance are unable to safeguard cultural heritage or do not have clear plan to address negative impacts for urbanization expansion.

The models have enabled the extraction of some points overlooked by governments such as non-observance of the specificities of the urban area, and the inadequacy of these residential projects for the lifestyle of the archaeological area. The study and analysis of successful housing models such as Tafilalt and Tinmain projects (Djelloul Zenati, 2018) enabled the extract and proposing the most important recommendations for the success of new housing projects in the region, which require that housing projects and other projects be planned according to the design criteria of the urban fabric of the region.

And also, the distribution of land use so that the preservation of heritage sites and the surrounding area of calm and privacy. In addition, laws must be issued to prevent the owners of archaeological houses from removing their archaeological property to preserve them.

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