

OASIAN CITIES: A TOURIST HERITAGE THREATENED BY THE INVASION OF URBAN EXPANSION, CASE OF THE OASIS OF BOUSSAADA, ALGERIA

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Abstract: The Oasis of Boussaâda is a natural, architectural and cultural heritage, which made it a destination for investors in the field of tourism. Since the 1980s, there has been a random expansion of uncontrolled structures within palm groves, which have become threatened with extinction, because of the lack of urban space and the increasing demographic growth. In this context, the present study dealt with the discussion and analysis of the impact of urban expansion on Boussaâda Oasis, which received large numbers of immigrants from most of the country during the period 1987-1998. These factors have resulted in increasing population growth and rapid urban expansion; but most of the time, this expansion was irrational and not subject to urban legal constraints because of the weak mechanisms for applying laws and influence of government planning and policy which has had impacts on the oasis. Within this perspective, the research aims to follow the stages of urban expansion of the oasis of Boussaâda, showing the expansion reasons and the consequences on the expense of the Oasis.

Key words: Oasis of Boussaâda, Algeria, Oasian Cities, Tourist Heritage, Urban Expansion, Population Growth, government planning and policy

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INTRDUCTION

The oasis is a specific landscape that exists with deserts in arid regions (Jia et al., 2004). It is the basis of human settlement and economic development (Liu et al., 2018) because of the availability of fertile soil, fresh groundwater and surface runoff from nearby mountains (Luo et al., 2008; Zhou et al., 2017). And it is one of the characteristic of ecological landscapes and the primary space for human life and agricultural production in the arid region (Wang et al., 2010). The urban expansion on one hand is an indicator of economic, social and political growth whereas, on the other hand it is at the cost of forests, agriculture lands, orchards and greenery of the city (Torrens and Alberti, 2000; Barnes et al., 2001, Ahmad and Laxmi, 2016). The encroachment of parks and reserves is increasingly becoming a problem, especially with the rapid urbanization (Adjewodah and Beier, 2004; Eshun and Tichaawa, 2020), which may result in a demand for the productive use of land, such as for housing, food production, public infrastructure, and other uses (Xie et al., 2014). The absence of healthy planning in the cities also helps to expand construction on the expense of agricultural land, in addition to the role of the behavioral factor represented in the desire of the population to reside in the suburbs outside the cities (Wahdan, 2013). Algeria, like the other countries in the world, has been living in a similar situation since the independence, despite the successive policies of organizing its field; and similar to the Algerian oasis cities, especially the steppes, the city of Boussaâda, with an oasis-tourist character, it is considered one of the interior regions, rich in natural and human tourism potential which have not been equipped with a tourism development strategy (Kherrou et al., 2018).

Plus it should be noted that the city is enduring a big population pressure, this environment that contains all this population has grown and developed because of the natural increase and the large influx of migratory numbers witnessed by the region in different periods of time (Berbache, 2008); the city attracted a total of 6348 arrivals during the period (1987-1998) (ONS, 1987-1998) especially from neighboring municipalities due to the uneven distribution of the development projects. This great population pressure resulted in an irrational expansion of the urban environment through the extension at the expense of the palm groves (Lettre Wallonie-Bruxelles à Alger n°1, 2008-2010), the rapid expansion of oases is always accompanied by change of hydrological processes, soil and ecosystem stability (Maeda et al., 2011; Nian et al., 2014; Bai et al., 2014; Zuo et al., 2014; Zhou et al., 2017). Excessive expansion of oases may increase the high risk of environmental degradation in arid areas (Qi et al., 2007), and the result is the deterioration of the oasis. All this has negatively affected the beauty and reputation of the city, as its oasis-tourist character requires it to be a homogenous, functional and aesthetically pleasing area. As it is known, there is strong relation between environmental condition and touristic perspectives (Ilieş et al., 2017; Azhayev et al., 2020).

Therefore, the study of urban expansion on the oasian cities and its impacts on the stability of oases are essential for sustainable development in the arid regions. However, there were few researches to analyze urban expansion and its impacts on the oasis of Boussaâda. That is exactly what motivated our approach to study the impact of urban expansion on the oasis of Boussaâda.

STUDY OBJECTIVE

The main objectives of this study are to (1) detect the stages and the trends of urban expansion in the oasis of Boussaâda from 1972 to 2017; (2) identify the expansion driving factors and the consequences on the expense of the Oasis; (3) discuss feasible recommendations for the sustainability of the Boussaâda oasis. Through how to restore the beauty of the city and its tourist reputation, and make it more attractive.

STUDY AREA

Boussaâda is the closest oasis to Algiers, just about 250 kilometers south of it. It is one of the municipality's of the province of M'sila and also one of its centers in the middle of the province. The city of Boussaâda has an area of 248 km². It is located at 35° 12' - 35° 15' N

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latitude and $4^{\circ} 9''$ - $4^{\circ} 12''$ E longitude (Figure 1), this city has a population of 157476 inhabitants and a population density estimated at 635 inh/km^2 (DPSB, 2017). It has an important strategic location in terms of its presence on the axis of the national roads. It also has a diversity of natural, cultural and even tourist attractions beyond state borders.

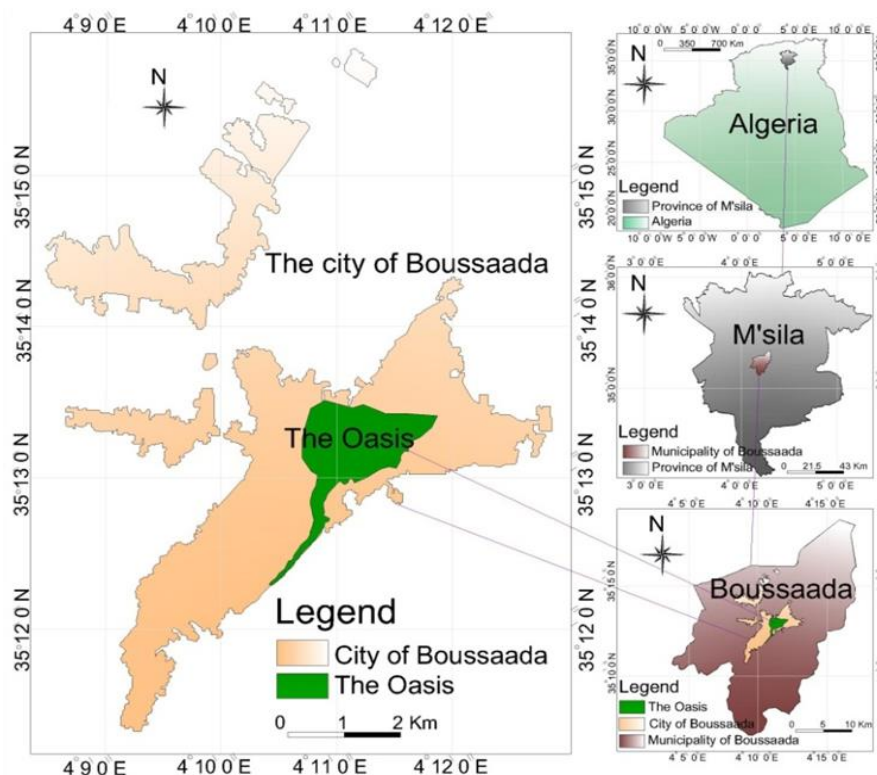


Figure 1. Geographical situation of the study area (Source: author's construct)

MATERIALS AND METHODOLOGY

In this study, we follow the historical approach in studying the stages of urban expansion of Boussaâda city, descriptive approach in the study and diagnosis of the current urban reality of the city, the analytical approach in the analysis and evaluation of land use change and the factors influencing it and the impact of urban expansion on the oasis by the increasing number of buildings and the lack of area of palm orchards, based on the information and data, both quantitatively and qualitatively from different sources. Aerial photographs and maps were used to explain the pattern of expansion and its trends in the city of Boussaâda. The most important tools used in this study were:

- AutoCAD program to draw some maps related to the location of the study area.
- The Geographic information systems technology ArcGIS and its various programs and use them in the analysis process.
- Remote sensing programs such as the ErDAS program in the processing of aerial photographs and we used recent images of 2004, 2017.
- Photography.
- The continuous field observations throughout the research period.
- Our focus was basically on the aerial photos of the area from about 16 years (since 2004), and the presentment of the agricultural areas that existed until recently, as well as the analysis of these images to show the urban expansion over the oasis.

The urban expansion of the oasis of Boussaâda

The oasis of Boussaâda whose Arabic name means "city of happiness", it is a meeting point between the north, south, east and west, making it an area of attraction since ancient times. It was an important trade center and a center for commercial convoys. The city dates back to 1492, when old mosque was established (The Palm Mosque) (Nacib, 1986). Near the Oasis, and then the buildings and residential neighborhoods were built around it, interspersed with squares and narrow and twisting streets, overlooking low and compact housing, and this is what He produced a compact and dense urban fabric, which form in total the k'sar or Medina of Boussaâda (the old city now), where the name of the oasian cities was called the "k'sar", when the inhabitants lived in the k'sar and work in the oasis (Figure 2).

The establishment of this site was based on the presence of fundamental factors in the old urban pattern of the Arab-Islamic cities, such that "the palaces were built over the highlands or on the hills and this in order to have more exposure to the sun in winter and protection from the wind and floods in addition to the difficulty of invasion" (Nacib, 1986).

When the French colonialism entered the city in 1849, Boussaâda had a population of 4,500, comprising 600 houses, 500 orchards and 25,000 palm trees. The area of the oasis was then estimated at $\frac{2}{3}$ of the city's area, and in 1870 a general plan for the oasis on the $\frac{1}{4000}$ scale was created, with the city and its surrounding orchards covering 272 hectares (Kouran, 2015). The orchards were small squares that extended all along the valley (Figure 3), (Nacib, 1986), where the residents of the oasis depended on the sources coming from the valley of Boussaâda, which in turn passed through the Ferrero Mill built by the Italian Antoine Ferrero near the waterfall because it was running water strongly.

In 1860, the colonialism established some neighborhoods adjacent to the palace "k'sar" to accommodate the colonists, and it completed some administrative and service facilities, in the same period, the urban fabric defined the birth of new neighborhoods from the eastern side, along the valley of Boussaâda and near the oasis. These expansions can be considered as the basis for architectural forms that are not subject to law or to an engineering system except to sweep areas of land (Berbache, 2005).

Due to the importance of the tourist area, many hotels were established such as the hotel of "Kerdada", the Beau-Séjour", the "Oasis Hotel", and the "Caid" hotel in 1929, the activity of some of these hotels continues today, and the first and highest goal is tourism.

After the independence, exactly from 1962 to 2017, the city of Boussaâda expanded in all directions with the emergence of legal and illegal neighborhoods and the construction on private properties and public lands. Here, we can refer to three images of the reconstruction identified by the city: residential retail areas, illegal construction and the new urban area (Berbache, 2005). so the number of housing units increased from 4819 housing units in 1966 to 25,122 housing units in 2008 (ONS, 1966-2008), to reach to 30915 housing units in 2017 (DPSB, 2017).



Figure 2. A general view of the k'sar of Boussaâda



Figure 3. The palm groves (the oasis) next to the valley of Boussaâda

Urban expansion trends of the oasis of Boussaâda

During the period 1962-1972, great stagnations were recorded in the construction and housing sectors in the wake of independence.

From 1972 to 2001, the city of Boussaâda witnessed rapid urban dynamics: 5 districts in 1972, 10 districts in 1983 and more than twenty in 2001, and found births in unstable marginal areas, harboring more than 60% of the city's population (Salmon et al., 2009), as the area of the built framework evolved from 1.21 km² in 1972 to 6.62 km² in 2001 (RBA, 2001). Its urban texture has speeded in a remarkable and poorly controlled manner: first, towards the southwest, by fabrics developing very different typologies; then, from the 1970s, the city developed programmed urban fabrics to the east of the city center, and other unplanned fabrics to the west.

From 2004-2017, once its natural location was saturated, the city expanded to the far northeast, then towards the northwestern side, through the sand dunes ring; the formatting operations (utilities, road network, potable water...) in these areas are inexpensive compared to rough or steep areas (Hadjab et al., 2012), at which time the built-up area increased from 10.08 km² in 2004 to 10.18 km² in 2007, it reached to 10.51 km² in 2017 (RBA, 2017), (Figure 4).

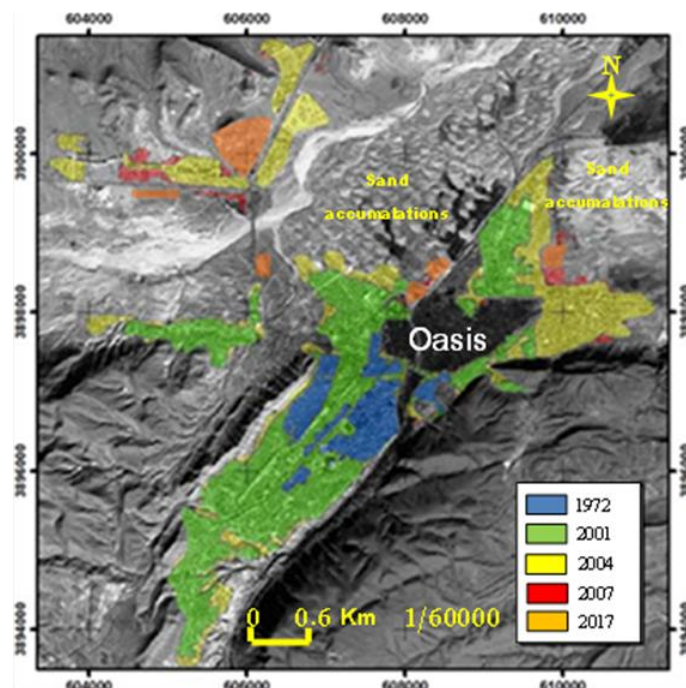


Figure 4. The urban expansion of Boussaâda city (Source: Salmon et al., 2009; and authors processing)

Factors influencing the urban expansion of the city towards the outskirts

• Natural factors

The expansion of the city is proceeding according to the imperative of the natural obstacles that control its direction. Natural geographical conditions are the basis of urban expansion (Tong et al., 2018).

The development of the urban fabric of the city of Boussaâda has a general direction in the north, governed by the mountain heights represented by the mountain of "Kerdada" in the east and the mountain of "Izzaddin" in the west, as well as the agricultural lands (Oasis of Palms) located in the northeast, the woods in the northwestern part of the city, and the sand dunes to the north. These natural elements

permeate a dense hydrographic network, most notably the valley of “Maytar” and the valley of Boussaâda, which divides the city into two parts, east and west (Berbache, 2008), (Figure 5). All these natural barriers greatly affected the city's urbanization process.

• **Population growth and immigration factors**

The city of Boussaâda witnessed rapid demographic growth, and rural immigration. The city of Boussaâda was rapidly growing in 1966-77, when the population increased from 24244 in 1966 to 50800 people in 1977 (6.1% growth rate), which doubled the population in 10 years with an amount of 26556 people because of the local immigration.

The number of immigrants according to the official census for the period 1966-1977 was 9661 immigrants at the rate of 878 immigrants annually (ONS, 1966-1977). This indicates that the city is an attractive region for the population, due to its tourist importance, its location on the one hand, and also its arrangement in the urban network of the province, where we find it occupying the second place, in addition to its availability on various installations and necessities of life. The rural migration to the city of Boussaâda had a percentage of 63.4% of total arrivals during the period 1987-1998 (ONS, 1987-1998), this explains the poor living conditions in these areas with the low level of health and educational services, which compels them to migrate, especially the rural areas, which led to the migration of its residents towards the city in search of security, stability and a better life. The continuity of the migration movement towards the city of Boussaâda is also evidenced by the increase in the population during the period 2008-2017, where the city's population moved from 125553 in 2008 to 157476 in 2017 (2.87 % growth rate) (DPSB, 2017).



Figure 5. Three dimension view of the oasis of Boussaâda (Source: <https://earthexplorer.usgs.gov> and authors processing)

Several researchers noted that there was significant correlation between the total population and the built-up area (Tong et al., 2018), which indicated that population growth was one of the main driving factors of urban expansion, so many residents of the neighboring municipalities moved to the city, resulting in its expansion into suburbs surrounding the city, we mention specifically at the expense of the oasis.

RESULTS AND DISCUSSION

Structural changes in the architectural heritage of the oasis

The cultural heritage of the oasis is the nature of traditional housing, which symbolizes a society adapted by simple means to climatic and natural data. However, with the random urban expansion, some buildings were subjected to changes and transformations by their residents, as many residents began to demolish their homes and were replaced by modern residential buildings, while housing that preserved the original local character has experienced changes in the internal structure, or at the level of facades.

The degradation and loss of agricultural land of the oasis

A number of studies (López et al., 2001; Grigorescu and Kucsicsa, 2017; Ahmad and Laxmi, 2016; Lasisi et al., 2017) have shown the effect of uncontrolled and unplanned urbanization, in the form of sprawl, on vegetation and agricultural land-uses, subjecting peri-urban areas to multiple activities which are mostly informal. Urban dynamics and development also contribute to the extinction or shrinking of farmlands (Lasisi et al., 2017).

The city of Boussaâda, when found on this site, was not expected to reach this large and rapid growth which was at the expense of agricultural land and non-renewable properties. We recall in particular the oasis located on the eastern side of the valley (Figure 8), which is considered as the city's lung, it also plays an effective role, because it is an impenetrable barrier to sand encroachment into the city (Berbache and Hadjab, 2017), with an exceptional biological diversity, and a system of practical knowledge and practices that humans have created for the sustainable management of adaptation and climate change, making it an area of integrated development throughout the ages. It is also a barrier to dust-laden winds due to its large area which is estimated at 250 hectares during the years 1850-1860 (DSA, 2017). Two types of agriculture are practiced in the oasis: continuous palm growing and vegetable and fruit cultivation (Berbache, 2008), (Table 1).

Table 1. The area of the oasis and the number of palms change compared to the number of dwellings (Data source: DSA, 2017)

The years	The area of the oasis (hectare)	Number of palms	Number of dwellings
2004	155	10,000	268
2017	100	6,000	500

Table 1 show the oasis contained 25,000 palm trees and 500 orchards, between the years 1850 and 1860, but this number dropped to 10,000 palm in 2004, and to 6,000 palms in 2017 (DSA, 2017), and palm trees area fell from 155 hectares to 110 hectares in 2005 (Guettouchi et al., 2015), to reach 100hectares in 2017 (DSA, 2017), and the area of agricultural land decreased by 50%, where every 08 palms per 10 inhabitants (Nacib, 1986), and today it became 10 palms for every 50 inhabitants, where the number of houses reached 268 dwellings in 2002, and then to more than 500 homes in 2017 (DPSB, 2017), and the oasis now represents 1/4 of the city's area, after it was two-thirds of the city's area during the years 1850-1860 (Belouadeh, 2011), (Figure 6).

Through the (Figure 6), we note an increase in the number of random housing, in contrast, we note a decrease in the density of palm trees in the palm grove and a decrease in oasis lands.

Factors contributing to the invasion of the urban expansion of the oasis

• Influence of laws and legislations for preserving tourist heritage and agricultural lands

Although there are several laws promulgated by the Algerian legislator that emphasize the protection and rehabilitating the architectural heritage and the protection of agriculture land and prevent them from being converted to urban land, foremost of which is the cultural heritage law (98-04), the Real Estate Directive law (90- 25) and the Development and Reconstruction Law (90-29), but the field incarnation of these laws is very weak with the absence of deterrence devices for violators of these texts.

This rapid urban dynamics with the lack of a clear plan for urban management resulted in an irrational expansion of the urban environment through the extension at the expense of the Oasis.

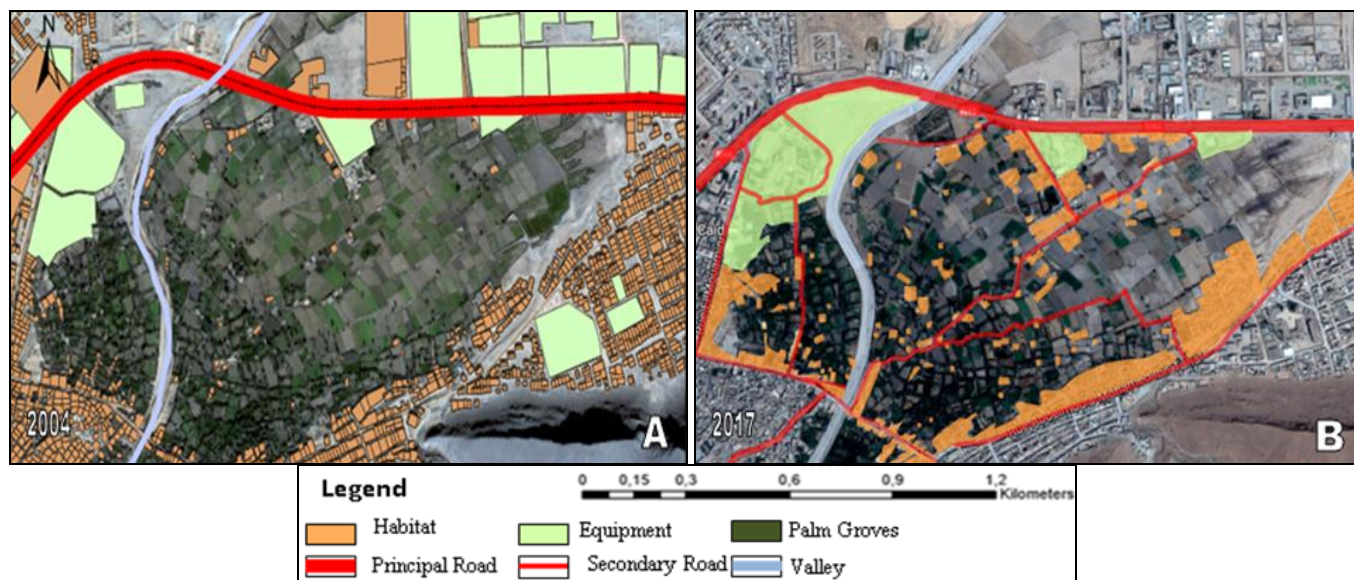


Figure 6. The random habitation invasion of the oasis and the decrement of its lands between 2004 and 2017 (Sources: provided by Google Earth images (A, 2004-B, 2017) and authors processing).

• Influence of government planning and policy

Governmental actions and intentions that regarding urban expansion also have decisive influences on the socio-economic development (Tong et al., 2018).

- The oasis was provided with the construction of some equipment with an area of 6.3542 hectares, distributed as follows (Table 2).

Table 2. Types of equipment inside the oasis (data source: RBA, 2017)

Equipment type	The area (hectares)
Tourist	4.57
Mosque	0.05
Educational	1.625
Security	0.1092
Total	6.3542

- The oasis benefited from the technical networks like the electricity network in 1981.

- The oasis benefited also of the natural gas and drainage channels throw networks in the period (2006-2007).



Figure 7. The urban Expansion on the expanse of the oasis



Figure 8. Abandoned and degraded gardens in the palm groves

The establishment of some necessary facilities and services by the state, and the construction of roads in the vicinity and inside the oasis, made it easier for citizens to build there. Recently, several studies have explored that there is an important relationship between vehicular roads and urbanization (Xie et al., 2016). However, the vehicular roads construction in oasis of Boussaâda is still unknown.

All these factors combined led to a partial destruction of the oasis (Nouibat et al., 2014), Figure 7, Figure 8.

CONCLUSION AND RECOMMENDATIONS

Our study showed that the Oasis of Boussaâda witnessed a rapid urban expansion that led to the consumption of its urban area, as this expansion has governed factors, which are the natural factors that made the city's expansion towards the north and the population and migration factors (local and rural) as large numbers of population have moved to the urban area, attracted by the importance of the city Tourist, education, employment, health care, and other public resources available in the city center, and given the saturation of the urban fabric of the city, the residents were forced to reside on its outskirts in a random manner, which led to: Structural changes in the architectural heritage of the oasis and the degradation and loss of agricultural land of the oasis, and factors including: influence of laws and legislations for preserving tourist heritage and agricultural lands, influence of government planning and policy, the nature of the real estate ownership of the oasis.

Through the results of the study, we have suggested a series of recommendation are as follows:

- ❖ Forming committees for monitoring and preserving agricultural lands from the phenomenon of urban expansion.
- ❖ The necessity of coordination between the concerned authorities in order to put an end to the phenomenon of urban expansion on the agricultural lands in the oasis.
- ❖ Determine the urban expansion trends of the city in a studied and sound manner.
- ❖ Urban planning and policies have a direct influence on urban expansion, so the planning and policies must be based on the environmental, economic, and population factors in order to guarantee sustainability of the oases.
- ❖ With regard to the scale of the intervention, this must take into account the development of tourist assets throughout the region the example: (1) of the valley of Boussaâda which constitutes an exceptional geo-site to protect and enhance by creating a geological path, in order to have a tourist route around the Moulin Ferrero, the palm grove and the valley; (2) Paying attention to the architectural heritage within the oasis by restoring the old buildings in order to exploit them on the tourist side.
- ❖ The development of a sustainable tourism policy through the restoration, preservation and integration of existing heritage on the one hand, and on the other, the encouragement of foreigners and locals to invest.

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